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FIVE DOLLARS PER YEAR

JUNE, 1951

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# POWER

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# COSTS

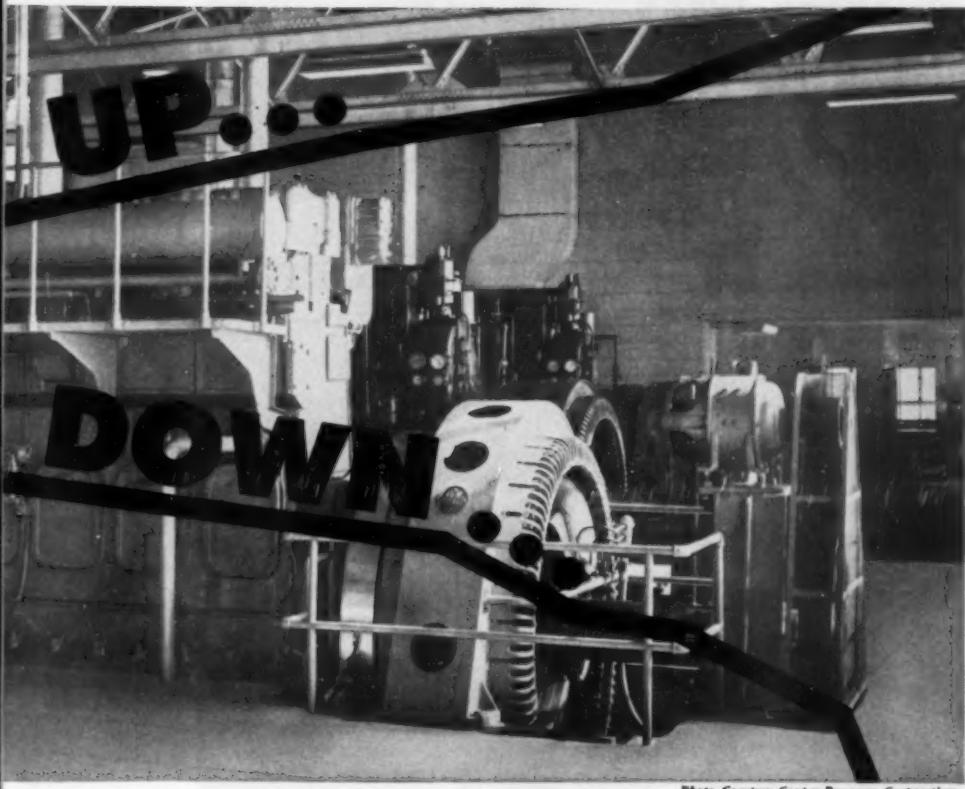


**When you lubricate  
with TEXACO  
URSA OILS**

For maximum power and minimum maintenance costs, lubricate your Diesel, gas or dual-fuel engines with *Texaco Ursa Oils*. These famous oils keep engines clean—free from power-robbing carbon, gum and sludge. *Texaco Ursa Oils* eliminate wasteful blow-by because rings stay free, ports stay open and valves function smoothly . . . assuring better compression and combustion . . . full power



# TEXACO



*Photo Courtesy Cooper-Bessmer Corporation*

... less fuel consumption.

*Texaco Ursa Oils* give bearings and all moving parts full protection . . . assure minimum wear, longer parts life and lower costs for upkeep. For greater efficiency and economy, *Texaco Ursa Oils* are your best bet.

Approved by leading engine builders, Texaco Diesel lubricating oils are available in every needed viscosity. Use them and you'll see why they are America's favorite. For example, in the Diesel field:

**More stationary Diesel h.p. and more railroad Diesel locomotives in the U.S. are lubricated with Texaco than with any other brand.**

A Texaco Lubrication Engineer will gladly help you increase power and cut costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N.Y.

# URSA OILS

**FOR ALL DIESEL, GAS  
AND DUAL-FUEL ENGINES**

# Three more Diesel-Electric tugs

## for the Great Lakes Fleet

JOINING THEIR sister vessel, the *Ohio*, are these repowered GM Diesel-Electric tugs of the Great Lakes Towing Company fleet. They are the *California*, *North Carolina* and *Texas*. All are now on harbor duty in the Great Lakes and already have proved their worth in docking large cargo vessels in heavy river traffic.



NORTH CAROLINA



TEXAS



CALIFORNIA

Leader in Diesel engineering development for 39 years

## Cleveland Diesel Engine Division

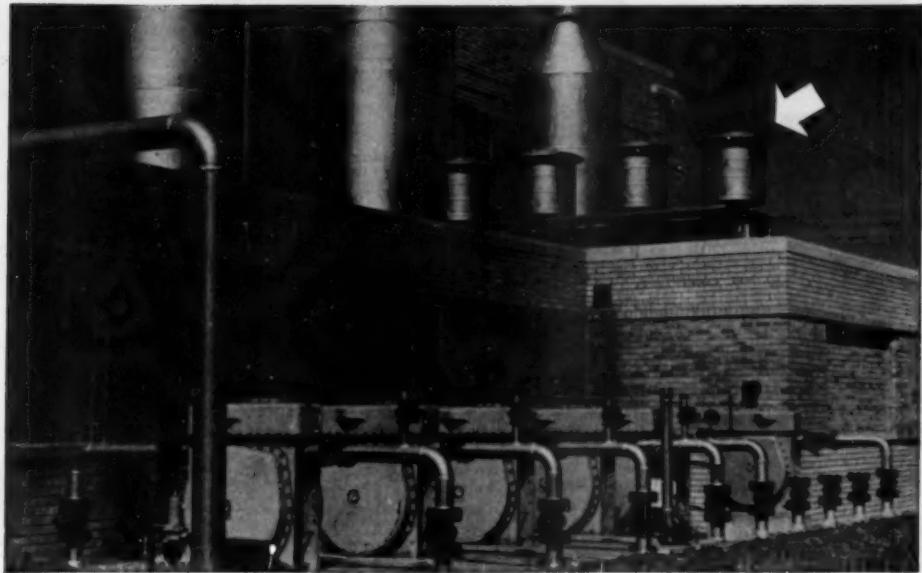
CLEVELAND 11, OHIO  
GENERAL MOTORS



ENGINES FROM  
150 TO 2000 H. P.

### SALES AND SERVICE OFFICES

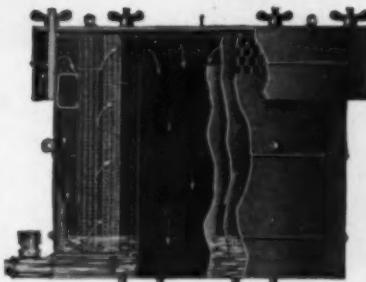
Cambridge, Mass. • Jacksonville, Fla. • Liverpool, N. S. • Miami, Fla. • Montreal, P. Q. • New Orleans, La. • New York, N. Y.  
Norfolk, Va. • Orange, Texas • San Francisco, Calif. • Seattle, Wash. • St. Louis, Mo. • Tampa, Fla. • Toronto, Ont.  
Vancouver, B. C. • Washington, D. C. • Wilmington, Calif.



## How La Junta power plant gets dust-free air for its diesels

THE FIVE big Fairbanks-Morse diesels—totalling 6,725 horsepower—that generate power for the city of La Junta, Colorado get maximum protection against airborne dust. Air-Maze oil bath filters on the engine air intakes of the newly-expanded plant remove abrasive dust and dirt, prevent engine wear. Intake air is passed through an oil-filled bowl, then through an oil-washed filter media. Before the air reaches any moving engine parts, it is thoroughly "scrubbed" free of particles that may have a damaging effect upon highly polished engine surfaces.

Air-Maze oil bath filters are among the many air and liquid filters used by leading diesel manufacturers to make their products last longer, work better, require less maintenance. The Air-Maze Corporation, Cleveland 5, Ohio.



Typical Oil Bath Filter. Cutaway view shows construction and air flow. Capacities up to 6500 CFM. Multiple units available for larger capacities.

*The biggest names in diesels are protected by Air-Maze filters*

AIR FILTERS

SILENCERS

SPARK ARRESTERS

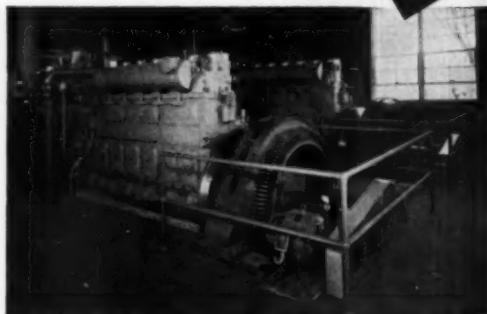
**AIR-MAZE**  
THE FILTER ENGINEERS

LIQUID FILTERS

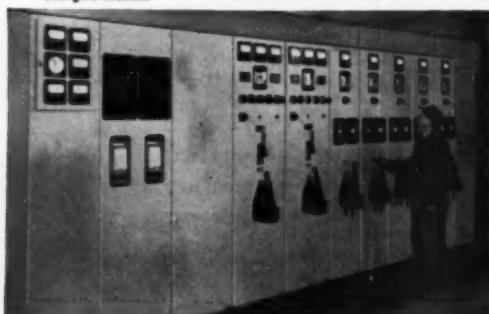
OIL SEPARATORS

GREASE FILTERS

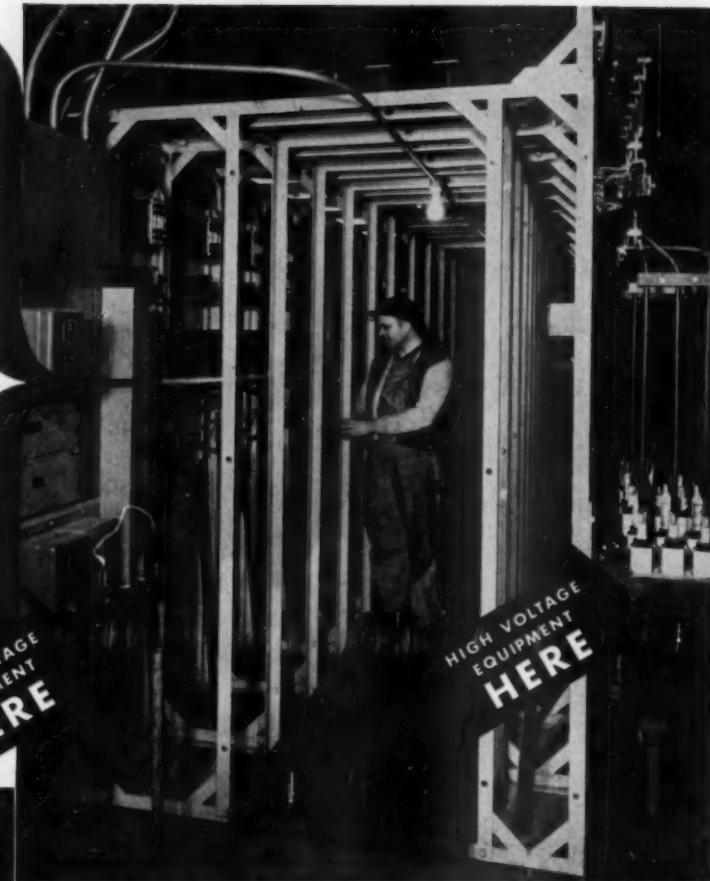
**Built-in  
OPEN  
CENTER  
AISLE**  
at Barnesville  
gives easy access to  
Switchgear



E-M Engine-Type Synchronous Generators at Barnesville. (Data: 606 kva, 2400 volt, 485 kw, 0.8 leading power factor, 3 phase, 60 cycle, 450 rpm.) Generators are direct-connected to supercharged diesels.



Ten-panel E-M Switchboard, Center Aisle Type, at new Municipal Plant. Includes 1 synchronizing equipment swing panel, 1 voltage regulator and meter panel, 2 generator control panels, 5 feeder panels and 1 blank panel for future expansion.



4200-TPA-2102

Three feet of aisle space built into your switchgear can represent the accident that *won't* happen . . . if you plan ahead for operating safety.

Take a look at your own power installation. Do you have to walk dangerously close to high voltage equipment to get within reach of low voltage apparatus? They don't at Barnesville, Minnesota!

Back of the Barnesville Switchboard, the operator enters E-M's Built-in Center Aisle through a locked door in the special safety fencing. He walks down a clean, well-lighted aisle free of obstructions. Non-slip flooring and a sturdy protective enclosure safeguard him further. He makes checks and gets maintenance work done easily and safely.

This special E-M Center Aisle Switchgear is pre-assembled and wired correctly and efficiently at the factory, but has none of the undesirable jammed-together compactness of most factory assembled switchboards. It is as attractive and as easily adapted to its surroundings as if it had been constructed right at your job.

In addition to Switchgear, the E-M power package for your plant includes matched Generators. You get the advantages of highly skilled E-M factory construction plus long experience in planning basic design to meet your specific needs.

It will pay you to call your nearest E-M field engineer for facts and data, at no obligation. Or if you wish, write the factory for E-M Publication No. 194.

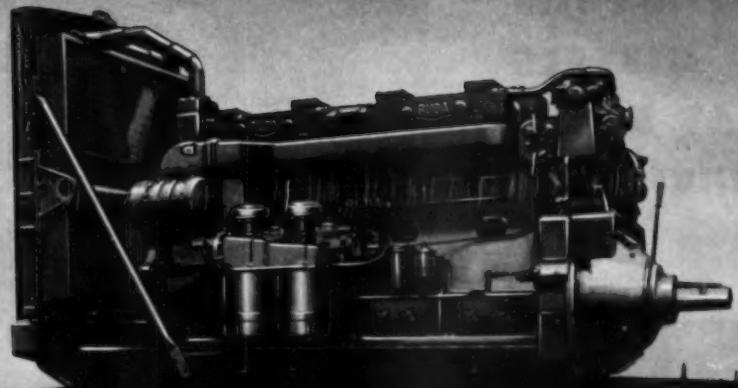


**ELECTRIC MACHINERY MFG. COMPANY**

MINNEAPOLIS 14, MINNESOTA

DIESEL PROGRESS

# OVERSHADOWS THEM ALL - BUDA "2505" OILFIELD ENGINES



# BUA

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Delco-Remy Generator and Regulator, combining high output with minimum weight for cross-country Diesel applications.

**SERVING THE  
DIESELS  
THAT SERVE  
AMERICA . . .**



**DELCO-  
REMY**



DELCO-REMY—A UNITED MOTORS LINE  
Service Parts and Delco Batteries  
Available Everywhere Through  
UNITED MOTORS DISTRIBUTORS

Modern, economical Diesel engines provide the power that carries America's travelers from town to town in many of today's supercoaches. And, on many Diesels Delco-Remy electrical equipment supplies the electrical needs.

The Delco-Remy name means much to the producers and users of Diesel equipment . . . it means outstanding performance under all conditions . . . dependable operation that helps to keep Diesels on the job.

**Delco-Remy**

DIVISION OF GENERAL MOTORS CORPORATION  
ANDERSON, INDIANA

**DELCO-REMY • WHEREVER WHEELS TURN OR PROPELLERS SPIN**

# 120 NORDBERG Radial ENGINES

in the WORLD'S LARGEST INTERNAL  
COMBUSTION ENGINE PLANT...



**NORDBERG Gas Burning Radials**  
at Alcoa's Point Comfort Reduction Works  
provide nearly 200,000 Horsepower  
24 HOURS A DAY—365 DAYS A YEAR  
to meet the full capacity demand!

120 of these Nordberg two-cycle Gas Burning Radial Engine Generating Units have been installed in the Aluminum Company of America's Point Comfort (Texas) Reduction Works to provide electric generating capacity to produce over 100,000,000 pounds of aluminum per year.

This tremendous installation exemplifies the way in which Nordberg Diesel Engines, in sizes from 10 to 9600 hp., are used to provide dependable, economical power for stationary and marine requirements all over the world.

## IMPORTANT FEATURES OF NORDBERG Radial ENGINES

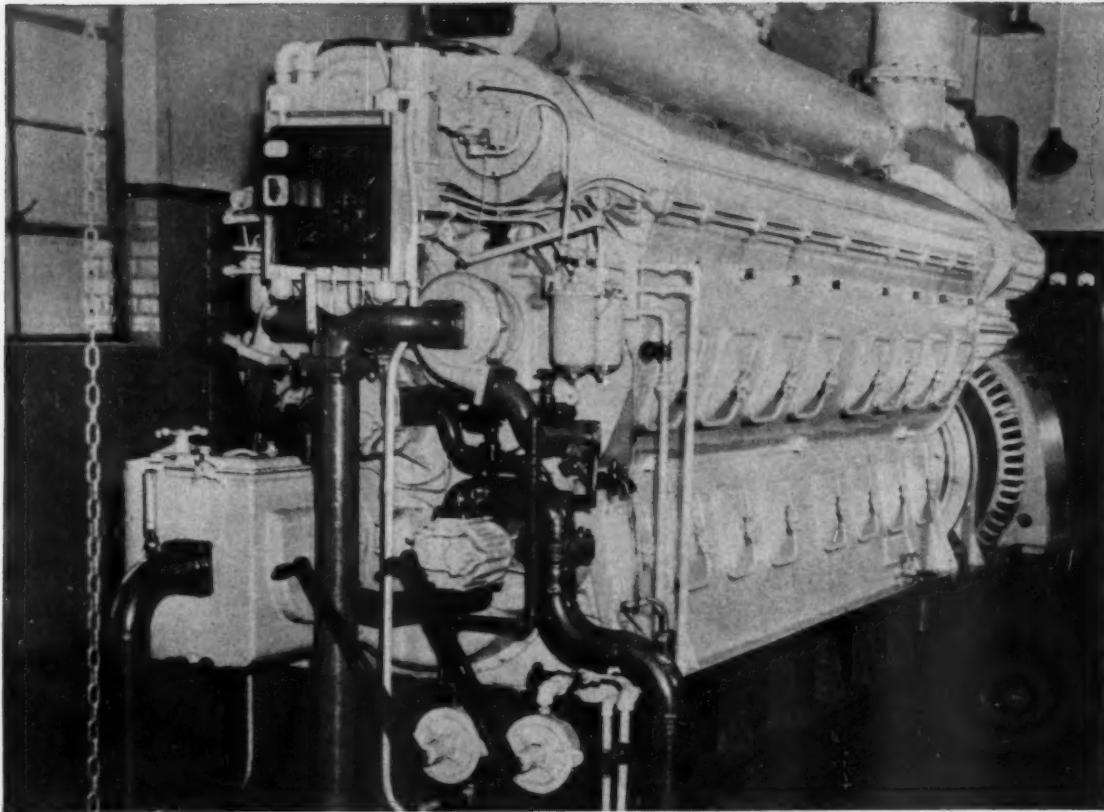
- LOWER INVESTMENT COST
- LOWER INSTALLATION COST
- LOWER OPERATING COST
- LOWER MAINTENANCE COST
- LESS SPACE REQUIRED
- AVAILABLE THREE WAYS...  
as oil burning Diesels, as  
natural gas engines, or as  
Dualfuel engines.

Applicable for industrial and municipal power plants and central stations or wherever compact, economical, dependable power is required. For full details covering Nordberg Radials, send for BULLETIN 172.

**NORDBERG MFG. CO.**  
Milwaukee 7, Wis.

PSS1





## Big lift for loaded diesels...

● To meet rapidly increasing power demands, a midwest power company installed four new 1440-hp diesel engines in 1948, one of which is shown above.

Steps were taken to insure uninterrupted service from these vitally needed engines. A Standard Oil lubrication specialist was consulted. Upon his recommendation, STANDARD HD Oil was given the important job of lubricating the diesels.

Despite the fact that engines have operated continuously from 6,000 to 7,000 hours with up to 110% rated load, there has been no lubrication difficulty. No maintenance, other than a valve grinding job, has been required. Engines have operated at top efficiency.

STANDARD HD Oil, a truly heavy-duty lubricant with effective detergent qualities and high oxidation resistance, will reduce maintenance and boost the reliability of your diesel engines.



A Standard Oil lubrication specialist is ready to help you gain maximum benefits from STANDARD HD. This man is located near your plant and will give you "on-the-spot" service. Arrange today for his visit by contacting the nearest Standard Oil office or by writing to:

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

**STANDARD OIL COMPANY (INDIANA)**



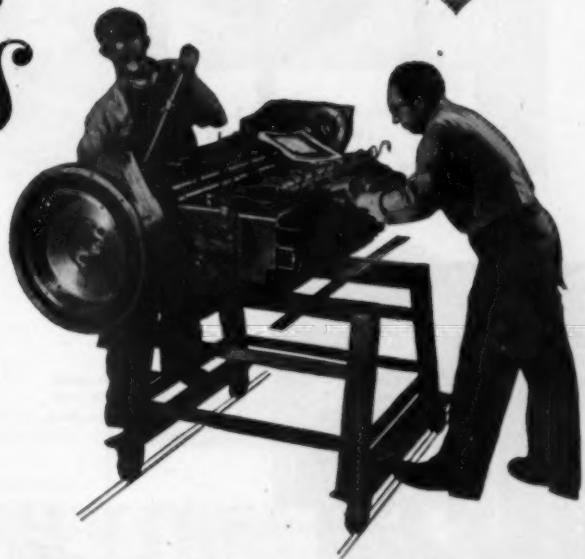


**BUILT**

**NOT ONCE BUT TWICE**

# *Cummins* CUSTOM <sup>BUILT</sup> *Diesels*

Rugged, lightweight, high-speed Cummins Diesels perform better because they're custom-built to fit each job. And each engine is actually built twice. Assembled, run-in tested, disassembled, inspected . . . then reassembled and tested again. Precision building, Cummins exclusive fuel system . . . efficient service and parts organization, enable users to get peak performance, less "down-time" and more rugged, dependable power from Cummins Diesels. See your Cummins dealer.



*Lightweight High-speed  
Diesel Engines (50-550 h.p.)  
for: on-highway trucks  
off-highway trucks • buses  
tractors • earthmovers  
shovels • cranes  
industrial locomotives  
air compressors  
logging yards and loaders  
drilling rigs  
centrifugal pumps  
generator sets and power units  
work boats and pleasure craft*

**CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA**  
Export: CUMMINS DIESEL EXPORT CORPORATION • Columbus, Indiana, U.S.A. • Cable: CUMDIEX

**Diesel power by  
CUMMINS**



TRADEMARK REG. U. S. PAT. OFF.

# CUT DIESEL COOLING COSTS

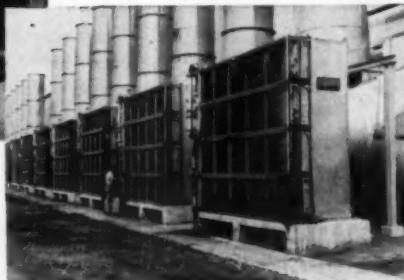
## WITH TRANE DRY TYPE FLUID COOLERS



Upblast Trane Dry Type Fluid Cooler, Model GC 8-40, designed to cool jacket water.



Horizontal air stream model  
Trane Dry Type Fluid Cooler, Model EC 13-42, designed to cool water and oil.



120 Trane Fluid Coolers. Each one cools water and oil of an 1800 hp radial gas engine at an aluminum reduction plant.

Cut horsepower costs and save maintenance time when you use Trane Dry Type Fluid Coolers for your diesel and gas engine cooling. These units cool jacket water and lubricating oil without using refrigerants or water, and with only a minimum of power.

It's the careful engineering, the precise construction that allows the Trane unit to cool lubricating oil and jacket water (both at once, if you like) so efficiently. The flat plate-type fins and round tubes of the unit's core provide more heat transfer with less resistance.

Tubes are bonded to fins mechanically. This solderless bond is as durable as the metal itself and adds years of service to Trane Fluid Cooler life. Heat transfer is faster and more complete; the unit does a bigger, more economical cooling job. The wide range of standard Trane Coils available for the unit can produce the exact circulation and heat transfer rate for any size of unit.

Ruggedly built, the Fluid Cooler can perform effectively indoors or outdoors under the roughest conditions, taking wind and shock load without added bracing. The unit is husky enough to take the added shocks of portable installations.

With Trane dry-type diesel cooling, air is the coolant, so there's no water to replace or to treat, no sediment to remove. Maintenance is simple and seldom. All parts are easy to reach for servicing. Coil headers are outside the casing, and motors are conveniently placed. Coil tubes are cleanable.

Two types of Trane Dry Type Fluid Coolers, in 22 sizes, answer virtually any diesel cooling problem with a standard unit. These two models are the EC units, with horizontal air flow, and the GC units, with air flowing upward through the coil.

Trane Fluid Coolers normally have steel casings, aluminum fans, copper tubes and aluminum fins. However, the units can be furnished in special constructions and materials to meet almost any job requirements.

# TRANE

THE TRANE COMPANY, LA CROSSE, WISCONSIN  
Eastern Mfg. Division . . . Scranton, Pennsylvania  
Trane Company of Canada, Ltd., Toronto  
OFFICES IN 80 U.S. AND 14 CANADIAN CITIES

MANUFACTURING ENGINEERS OF HEATING, VENTILATING, AIR CONDITIONING AND HEAT TRANSFER EQUIPMENT



## DUAL-FUEL...

*Teamed with Steam  
in new dual-power plant...*

Here is an ideal combination of generating power—dual fuel engines, backing the big steam generating station being built for this group of six R.E.A. Cooperatives.

**Why Dual Fuel?** Dependability; fast, easy starting; lower operating costs. Although ideal for peak load and standby service, these engines seem destined for 24-hour duty in view of the current rate of increase in load in this rural area.

**Why Fairbanks-Morse?** Many types and sizes of proved dual fuel engines (including these 3500 hp. units) to meet a variety of load conditions; more than 50 years of experience in working with and solving the problems of publicly owned power groups.

For details on how this group's experience can help solve your power problems, write . . . Fairbanks, Morse & Co., Chicago 5, Illinois.



**FAIRBANKS-MORSE,**  
*a name worth remembering*

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • ELECTRICAL MACHINERY  
PUMPS • SCALES • RAIL CARS • MAGNETOS • FARM MACHINERY

**10,500 FAIRBANKS-MORSE  
DUAL FUEL hp.**

Three 3500 hp. Model 31's in new central station for Northeast Missouri Electric Power Cooperative.



**Facts About this Latest FAIRBANKS-MORSE  
DUAL FUEL Installation**

Three 3500 hp. Fairbanks-Morse Model 31-AD-18 engines rated @ 350 hp/cylinder @ 277 r.p.m. . . . can be put on the line in less than a minute from a cold start . . . will operate at an estimated total fuel cost of under 4 mills/kw-h . . . can be switched instantly from oil to gas or from gas to oil . . . are complete with well-arranged automatic accessory equipment.

# MACK TRUCKS...for All-Out Effort

● Today's all-out effort in National Defense and civilian supply places an ever-increasing strain on truck equipment. Fact is, up to 75% of all incoming and outgoing materials at the nation's defense plants are now hauled on motor trucks.

Under such emergency conditions "Built Like A Mack" takes on added significance . . . means trucks that stand up better under the punishing wear and tear of bigger loads and more intensive service.

Wherever they operate . . . in whatever phase of the national economy . . . Mack trucks have one thing in common. Being Macks — they're built to outlast them all — to give *long-lasting* economy and reliability. That's a basic Mack advantage, vitally important during periods of uncertainty when replacements may be difficult to obtain.

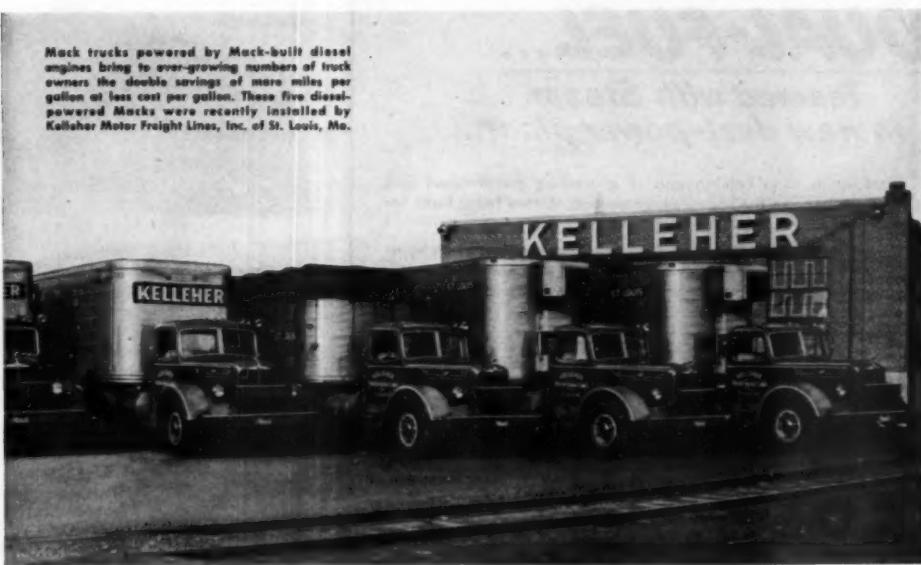
Your nearest Mack branch or distributor has the right Mack for your particular line of business — a truck that's built better to give you benefits in low-cost maintenance and peak performance for many years to come.



... outlast them all

Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N.J.; Long Island City, N.Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Mack trucks powered by Mack-built diesel engines bring to ever-growing numbers of truck owners the double savings of more miles per gallon at less cost per gallon. These five diesel-powered Macks were recently installed by Kelleher Motor Freight Lines, Inc. of St. Louis, Mo.



**"Tycol Adelbus cuts costly overhauls...  
Diesels give years  
of top service  
with negligible liner wear!"**



Exactly! Tycol Adelbus Diesel Oils are fortified with selected additives that provide a tough "film of protection," and help to eliminate sludge and varnish. They have excellent detergent-dispersive characteristics and amazing resistance to heat... assure the piston seal that means FULL power and economy... and provide exceptional resistance to oxidation.

Complete information about Tycol Adelbus Diesel Oils is available from your nearest Tide Water Associated office. Call or wire now.

SEND FOR A FREE COPY OF "TIDE WATER ASSOCIATED LUBRICANIA"



Boston • Charlotte, N. C. • Pittsburgh  
Philadelphia • Chicago • Detroit  
Tulsa • Cleveland • San Francisco





**INDUCED DRAFT**—High velocity air discharge prevents recirculation in congested areas; allows complete freeze-up protection in cold climates.



**FORCED DRAFT**—Most accessible installation—mechanical parts are placed beneath coils. Economical in first cost and in low horsepower required.



**SMALL UNITS**—A typical installation—serves a power generating plant. Smaller horizontal and vertical portable units are available.



**MECHANICAL PARTS**—Adjustable fans, fan hubs, gear reducers, driveshafts, couplers are Marley designed exclusively for cooling unit service.



**The Marley Company, Inc.**

Kansas City 15, Kansas

ALSO PRODUCERS OF WORLD'S MOST COMPLETE LINE OF WATER COOLING TOWERS



**MARLEY**

**DriCooler**

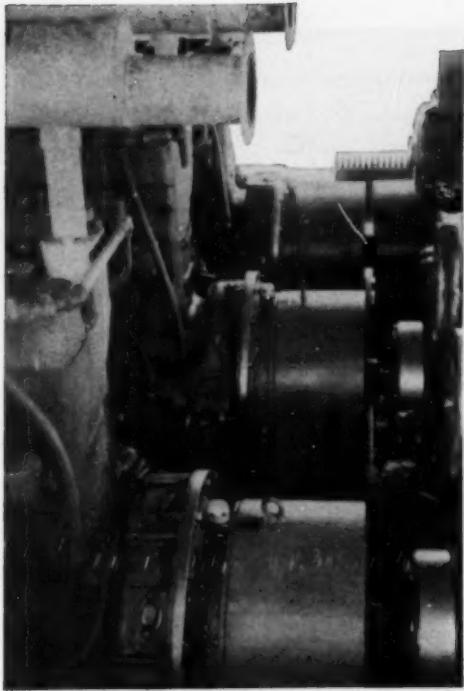
**Makes a World of Difference in  
Diesel Operation**

DriCoolers are the air cooled heat exchangers that do a precision job of cooling high temperature jacket water and lube oil. DriCooler's ability to pin-point operating temperatures as recommended by engine manufacturers assures maximum fuel economy, smooth operation and long service life.

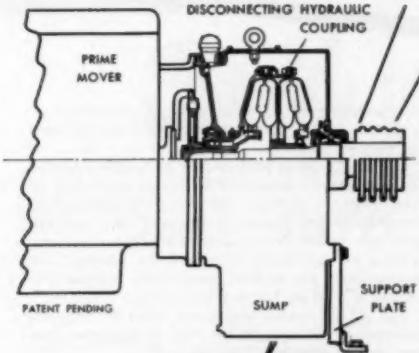
DriCoolers are produced in such a broad range of models and sizes that they provide efficient cooling for engines from 50 hp. to 5000 hp. They are applicable to any climatic conditions— are now in operation from Alaska to Arabia.

**OUTSTANDING DRIEOLER FEATURES** ★ Induced or forced draft designs to fit varying applications ★ Marley-design headers permit unusual flexibility of coil arrangement ★ Extra strong truss construction—either all steel or asbestos-board covered redwood frame ★ All mechanical equipment is designed, manufactured and guaranteed by Marley—proven by years of service in thousands of installations.

*For complete information call a Marley Application Engineer—  
there's one in every large city—or write for Bulletin DC-51*



The new Twin Disc Disconnecting Hydraulic Coupling acts as its own master clutch.



**Clutches & Hydraulic Drives**



**TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois**

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

## 40,000 Feet With No Down-time



Mechanical rigs equipped with the new Twin Disc Disconnecting Hydraulic Coupling are *making hole faster*—with far less maintenance—than ever before.

Take, for example, the Emsco GA-500 Drawworks, operated by O'Neal Drilling Company in West Texas fields. This rig has been in almost continuous operation since last March, when the HUD Couplings were installed, and, to date, has drilled better than 40,000 feet of hole.

"We have had no chain breaks and practically no chain wear, no clutch, bearing or engine failures since the couplings were installed," reports J. T. O'Neal, Jr.

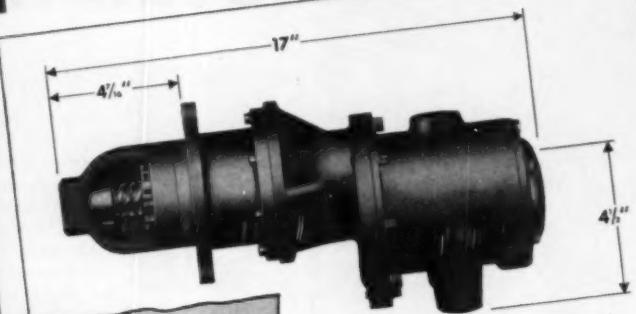
The Model HUD gives you all the advantages of fluid power in a unit that acts as its own master clutch. The hydraulic fluid is "dumped" and held temporarily in a reserve whenever a complete disconnect is desired.

The HUD assures power that "hangs on" because the engine can't stall. All "jerks," "jolts," "jumps" are cushioned. The operator can feel his way into a load with the throttle control alone. And, for a complete disconnect, he can actuate a valve to temporarily drain the hydraulic fluid.

For top performance from your mechanical rig, equip it with a Twin Disc Model HUD—the Hydraulic Coupling which acts as its own master clutch. Write for complete information.

# NEW AIR CRANKING MOTORS

Eliminates Batteries



INGERSOLL-RAND ANNOUNCES A COMPLETE  
LINE OF NEW AIR CRANKING MOTORS  
FOR ENGINE STARTING SERVICE.

Reliable and economical engine starting is now yours with powerful I-R Air Cranking Motors. Easy to install, these compact motors eliminate the need of generators, electrical controls and banks of storage batteries. Nine standard sizes, designed for use on over 150 commercial engines up to 3520 cubic inch displacement, are available to meet your individual requirements.

A powerful Multi-Vane air motor starts the engine through a standard Bendix drive, that matches the performance characteristics of the air motor. Air Cranking Motors cannot be burned out, or damaged by stalling. Their use also eliminates expensive repairs frequently caused by climatic conditions that deteriorate the insulation on electric motors. In many instances the yearly replacement cost of storage batteries pays the initial cost of an Air Cranking Motor.

In an emergency, a small bottle of compressed air or carbon dioxide piped into the motor may be used for starting purposes.

I-R Air Cranking Motors may be readily installed on your present engine by your own mechanics or your engine distributor. In mounting, the Bendix housing can be rotated on the gear case, and the gear case rotated on the motor housing to clear projections on the engine. Any mechanic familiar with maintenance of internal combustion engines can readily service an I-R Cranking Motor.

Fill out the coupon and mail it today for complete information on remarkable new trouble-free, low-cost, engine starting.

**Ingersoll-Rand**  
11 BROADWAY, NEW YORK 4, N. Y.

676-8

Dept. A, Ingersoll-Rand Company, 11 Broadway, New York 4, N. Y.

Please send me complete details of your new Air Cranking Motors.

Name \_\_\_\_\_

Engine Distributor

Address \_\_\_\_\_

Engine User

Make of engine \_\_\_\_\_

Model \_\_\_\_\_

Cu. in. of displacement \_\_\_\_\_



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## ENGINEERING BULLETINS on SLEEVE BEARING DEVELOPMENTS!



YOUR BUSINESS LETTERHEAD  
REQUEST brings all back issues while  
still available — but write now!

Here's a quick, convenient way for the designer, engineer and draftsman to keep up-to-date on developments in materials, design and applications of sleeve bearings, bushings and similar precision parts. The latest news on improved cast and sintered copper-leads . . . the new bi-metal rolled, split-type bearings . . . the re-design problems involved when shortages call for bearing lining changes . . .

"Sleeve Bearing Topics" will help keep you abreast of all of these developments. A request on your business letterhead places your name on the list. Right now we can also send you back issues to make your file complete. Fits standard files, punched for a 3-ring binder. Address your request to:

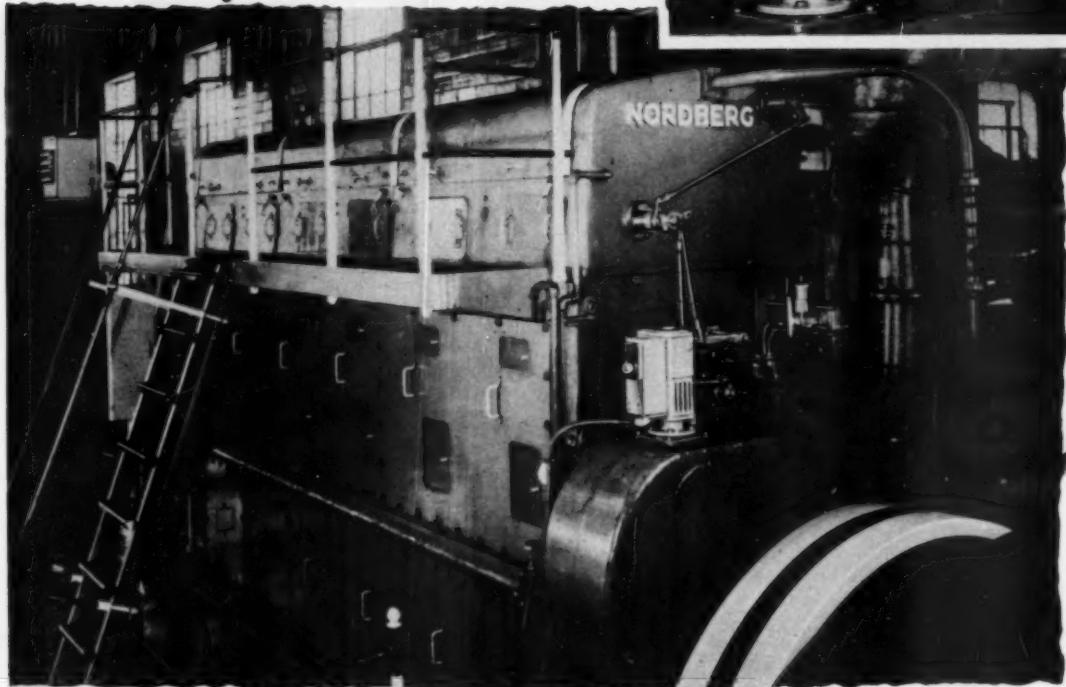
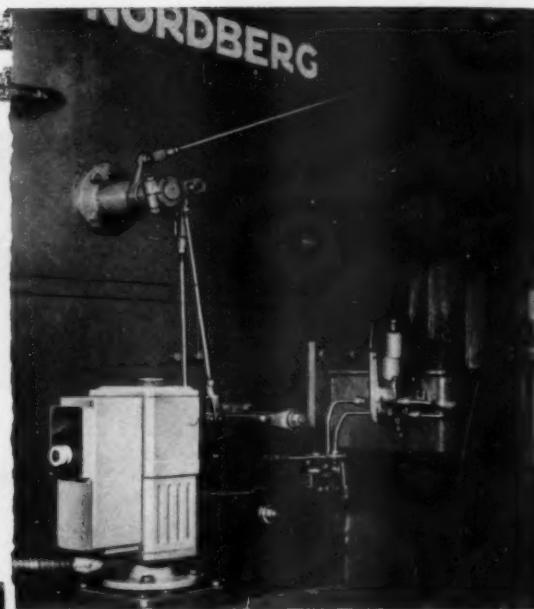
**FEDERAL-MOGUL CORPORATION**  
11039 SHOEMAKER • DETROIT 13, MICH.

### Since 1899

*Our six plants produce sleeve bearings in all designs and sizes; cast bronze bushings; rolled split-type bushings; bi-metallic rolled bushings; washers; spacer tubes; precision bronze parts and bronze bars.*

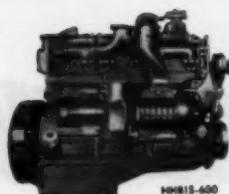
NORDBERG  
DUAFAUL DIESEL ENGINE  
Installed for  
ELKHORN LIGHT & POWER COMMISSION  
at Elkhorn, Wis.

Regulated by  
**Marquette**  
HYDRAULIC GOVERNOR

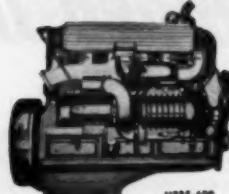


The **Marquette**  
METAL PRODUCTS CO.  
CLEVELAND 10, OHIO  
SUBSIDIARY OF COASTAL MILET CORP.

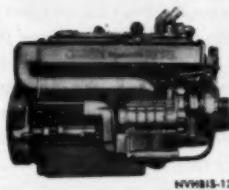
Also Manufacturers of:  
DIESEL ENGINE THERMOMETERS  
COOLING WATER FOR AIRCRAFT, TRUCKS AND BOATS  
FUEL OIL PUMPS AND INJECTORS  
PRECISION PARTS AND ASSEMBLIES



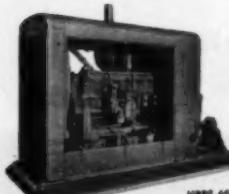
275 hp, 2100 rpm Cummins Industrial Diesel. Ross tube oil cooler.



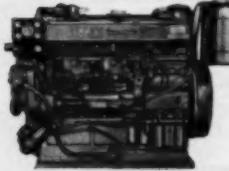
225 hp, 1800 rpm Cummins automotive Diesel. Ross tube oil cooler.



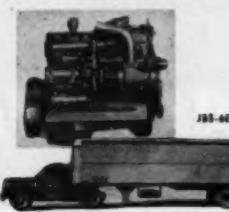
550 hp, 2100 rpm Cummins Industrial Diesel. Ross tube oil cooler.



225 hp, 1800 rpm Cummins Diesel power unit, with structural steel base. Ross tube oil cooler.



400 hp, 2100 rpm Cummins Industrial Diesel. Ross tube oil cooler.



150 hp, 2300 rpm Cummins Tractor-trailer and Bus Diesel. Ross tube oil cooler.

## PRECISION STANDARDS OF WARRANTED CUMMINS DIESELS DEMAND "EXTRAS" FROM COMPONENTS



**EXCHANGER**  
*more than meets the eye!*

"Built not once but *Twice*," is more than a slogan with Cummins. Every engine undergoes a complete rebuilding and retesting, after the first assembly has been disassembled for close inspection of all parts, following initial run-in on the test block.

This one example of the extra care and precision-workmanship that go into every Cummins Diesel is an example also of the demands which Cummins Engine Company, Inc. must necessarily make on all its components. For, in promising "the finest of engine craftsmanship, inbuilt ruggedness" and providing a warranty for one year or 100,000 miles, whichever first occurs, it's easily seen why Cummins has to be extremely prudent in its selection of so vital a component as an exchanger. *Oil and water temperatures must be closely guarded!*

So, the fact that Ross lubricating oil and jacket water coolers are utilized by Cummins is certainly conclusive proof of their dependability . . . likewise, an acknowledgment that the well known Ross qualities of thorough testing, large factor of safety, compactness and standardization jibe with the Cummins qualities of dependable profit-making performance, simplified service, interchangeability of parts and minimum downtime.

Consult Ross engineers for standardized exchangers serving engines of *any* rating. Request literature for design details.

### ROSS HEATER & MFG. CO., INC.

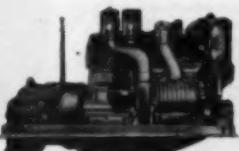
Division of AMERICAN RADIATOR & STANDARD SANITARY CORPORATION

1425 WEST AVENUE BUFFALO 13, N. Y.

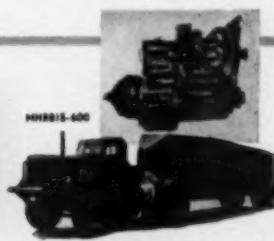
In Canada, Horton Steel Works, Limited, Fort Erie, Ont.



300 hp, 1100 rpm Cummins marine Diesel. Ross tube oil cooler.



375 hp, 2100 rpm Cummins marine Diesel. Ross tube oil and jacket water coolers.



Cummins Diesel engine HBB15-600, 225 hp, 1800 rpm. Ross tube oil cooler for engine lube oil and torque converter fluid.

*Serving home and industry*

# **TWO FAMOUS NAMES**

*an expanded line*



If your power-needs fall anywhere within the medium speed range from 275 to 6860 horsepower, you'll find there's a conservatively rated, service-certified B-L-H unit ready to do virtually any job. The famous Hamilton Diesel line has now been expanded by the addition of the Baldwin-De La Vergne 600 Diesel series, which has been setting impressive records in fuel economy and overall performance.

The integration of the line has brought other advantages with it of equal importance to you. Engineering experience has been pooled; this brings an expanded opportunity for research and development. Manufacturing facilities have been consolidated; this permits more effective operation, increased output, and improved deliveries. Purchasing, planning, production and sales operations have been coordinated—with the increased efficiency that unit control effects.

You'll find every thing you liked about the old lines has been retained . . . with new things added that you'll appreciate.

**LIMA-HAMILTON DIVISION**  
**HAMILTON, OHIO**

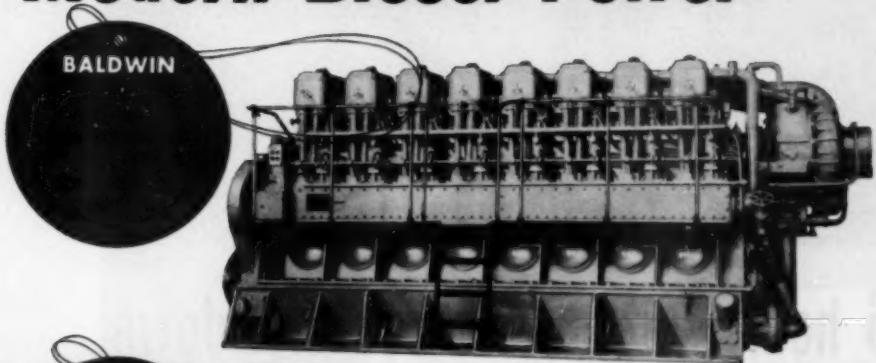
Low weight per horsepower, high efficiency over a wide range of output, and built-in dependability, are inherent characteristics of every B-L-H engine, assuring top performance in every application either as straight Diesel, or dual-fuel.

HAMILTON T-69-SA and T-89-SA 4-cycle, 9 x 12 turbo charge cover a range from 300 to 1060 h.p. at 600 to 950 rpm. These ruggedly-built units are especially adapted to stationary and marine applications.



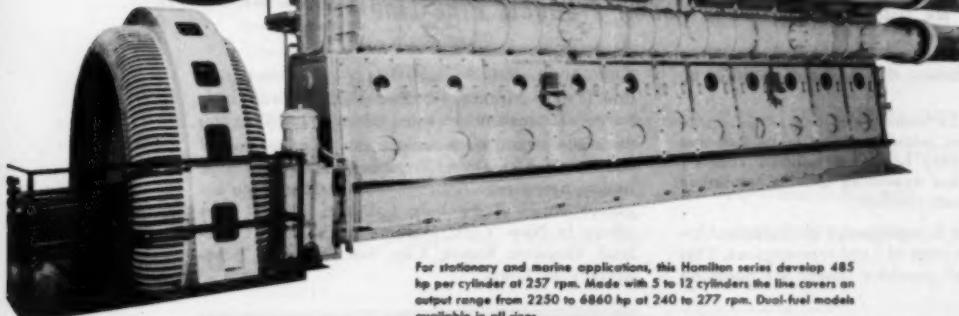
# *ARE JOINED to give you of Modern Diesel Power*

BALDWIN



BALDWIN-DE LA VERGNE 600 SERIES with 6 or 8 cylinders and available either normally aspirated or supercharged, provides a power range from 430 to 1500 hp at 360-625 rpm. The new-type, high pressure turbocharger permits operation up to 8000-ft. altitude. Dual-fuel units under development.

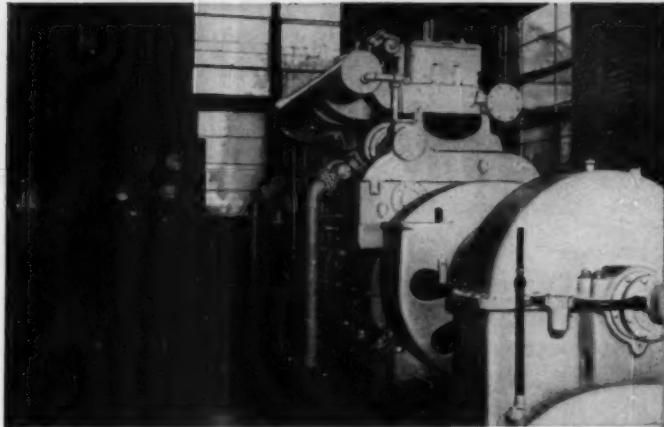
HAMILTON



For stationary and marine applications, this Hamilton series develops 485 hp per cylinder at 257 rpm. Made with 5 to 12 cylinders the line covers an output range from 2250 to 6860 hp at 240 to 277 rpm. Dual-fuel models available in all sizes.

**LIMA-HAMILTON**





# 21,716 hours without forced shutdown ... and still going strong

*that's the record of this Alco Diesel Engine  
at Barnett Station of Shell Products Pipe Line*

*Listen to Mr. C. C. Curvey, chief operator at Barnett, Ill., speaking:*

*"The unit operates 24 hours a day and is never shut down except for the annual routine inspection and overhaul. . . . Not only have we boosted capacity of this line 15%, but operating and maintenance costs have been much reduced."*

The Barnett station is equipped with a single Alco diesel—replacing a total of 3 old-type engines. This rugged Alco diesel provides power for pumping

1,050,000 barrels a month through the 8-inch pipe line. It's a 6-cylinder, 4-cycle engine with 12½ inch bore and 13 inch stroke, rated at 810 hp and 650 rpm. Such power and performance can be yours, too, if you install Alco Diesel Engines to meet your pipe line pumping requirements. Your nearest Alco engineer will be glad to help. Call him today at sales offices in New York, Beaumont, Chicago, Cleveland, Houston, Kansas City, San Francisco, Schenectady, St. Louis.

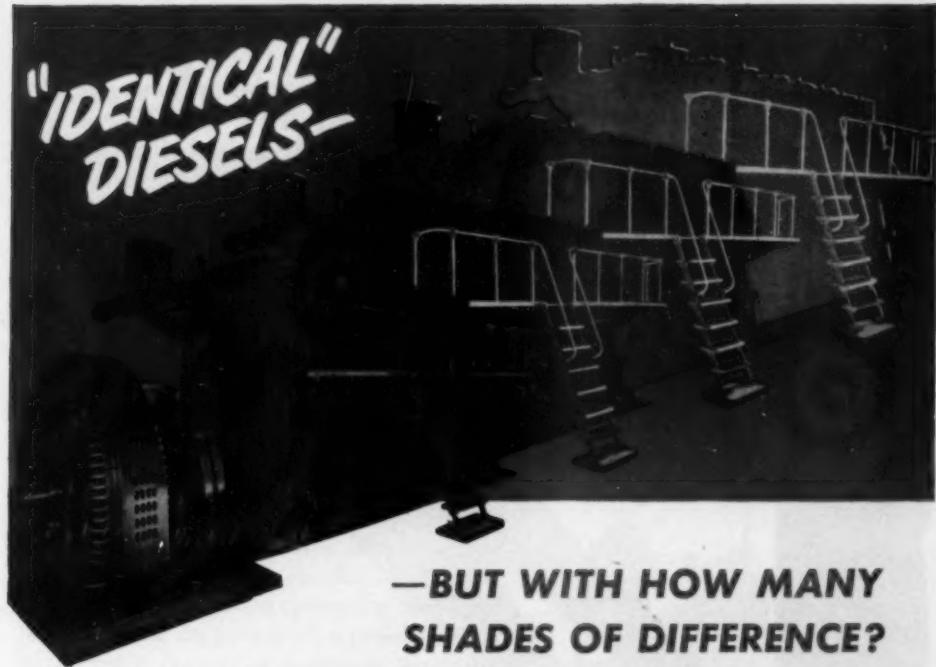


#### SPEED Vs. WEAR

Remember, since piston speed and journal travel per minute are both almost the same in medium speed and slow speed engines, wear is equivalent as well. Not only do you get unequalled dependability with Alco Diesels—you get long wear and low maintenance costs, no matter how difficult the service conditions.

## ALCO DIESELS

THE MARK OF QUALITY  
AMERICAN LOCOMOTIVE COMPANY



## **—BUT WITH HOW MANY SHADES OF DIFFERENCE?**

When they're delivered to the buyers a number of Diesels may be identical in make and model. But in actual use . . . working in different plants and climates . . . differently loaded, operated and serviced . . . the "identical" Diesels soon differ even more than just a shade. That's one reason the lubrication which seems ideal in one particular case may cause a similar Diesel working elsewhere to run up unnecessary downtime.

You can guard against the adverse effects of such variables . . . against the improper lubrication of your costly Diesels . . . by calling in a Cities Service Diesel Lubrication specialist. He knows all types of Diesels and their lubrication; he knows practical plant procedure, too. That's why the

Diesel lubrication schedule he will be glad to develop especially for you can provide far better protection for your Diesels—and for your profit showing. Contact the Cities Service office nearest you, or mail the coupon now for booklet on "Diesel Engine Lubrication."

***The Cities Service complete  
line of top quality petroleum  
products includes a Diesel  
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how **THIN** is a  
**SHADOW?**

Can you picture a millionth of an inch? About the thickness of a shadow would come close to describing it. Yet—parts for American Bosch diesel fuel injection equipment are produced to accuracy tolerances of millionths of an inch every day *on a production basis*.

Such precision manufacture explains the dependability of diesel fuel injection equipment supplied by American Bosch.

Combined with constant development and field engineering and extensive service facilities, it helps explain, too, why American Bosch-equipped diesel engines continue to set new standards of efficiency and economy in ever-widening fields of application.



# American Bosch

MAGNETOS • GENERATORS • VOLTAGE REGULATORS • IGNITION COILS  
ELECTRIC WINDSHIELD WIPERS • DIESEL FUEL INJECTION EQUIPMENT

AMERICAN BOSCH CORPORATION • SPRINGFIELD 7, MASS.

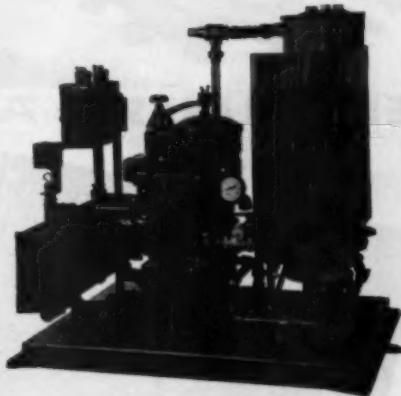
## A DE LAVAL "PURI-FILTER" THROWS ALL THREE OUT



Dirt, water and carbon are all promptly removed from diesel lubricating oil by the De Laval "Puri-Filter." Dirt is thrown out and stored in the bowl of the centrifuge. Water is separated from the oil and continually discharged to waste. Then the purified oil is passed through filters which remove all remaining impurities including colloidal carbon.

The "Puri-Filter" is the surest way there is to make certain that diesel lubricating oil is properly clean — it leaves absolutely nothing in the oil that can contaminate it or clog the lubrication system of an engine. Ring sticking is minimized; bearing life is increased.

The De Laval "Puri-Filter" yields other advantages. For example, it does not remove valuable additives from the oil. Moreover, it speeds up engine inspection and takes the curse off one of the dirtiest jobs in the power plant—crank case inspection.



• Ask for Bulletin DL-1.



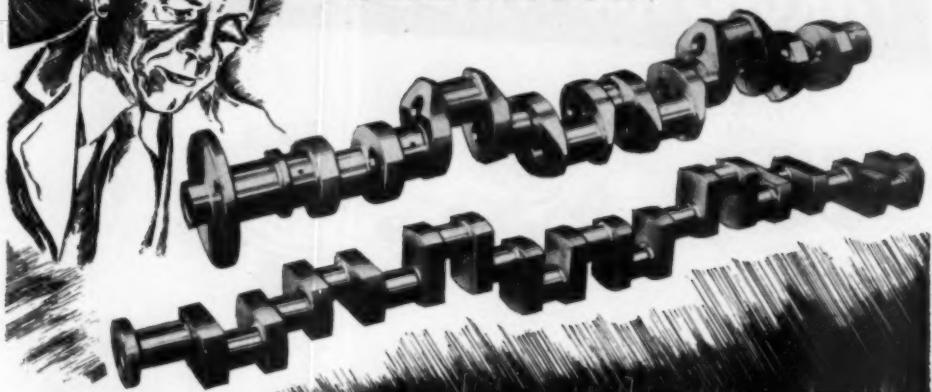
THE DE LAVAL SEPARATOR COMPANY  
165 Broadway, New York 6 427 Randolph St., Chicago 6  
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5  
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

# DE LAVAL

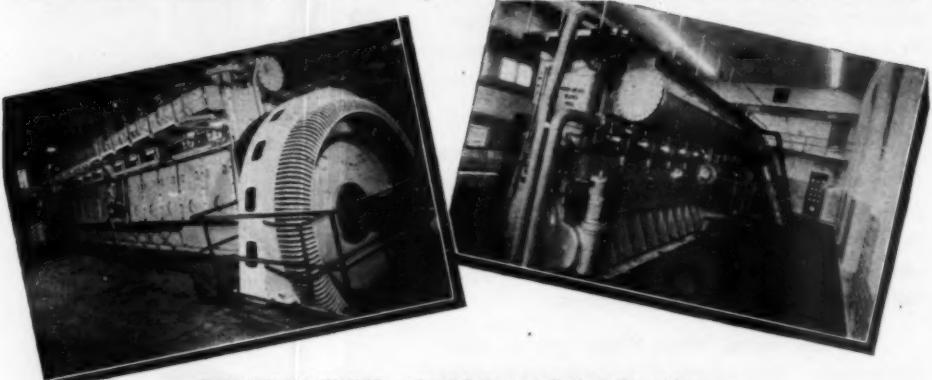
FOR DIESEL LUBRICATING OIL

*Watch & Clock*

**\*TO WATCHMAKERS'  
PRECISION~**



**ERIE CRANKS** are Preferred for **DIESEL ENGINES**

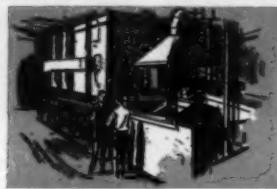


**F**INISH-MACHINED, and polished to "perfectionist" precision . . . tough, rugged Erie Diesel Cranks of all sizes are doing heavy duty daily in every kind of diesel engine service for utilities, in industrial plants, on the rails, and in marine service. Erie Forge believes in **one responsibility and one control** from ingot to jewel-like finished crank. Erie engineers and craftsmen supervise, direct and complete each operation within one plant . . . Another reason why Erie is the preferred source of supply for rugged, sturdy, diesel shafting . . . Steel Castings, Connecting Rods and drive shafts to specifications are regular production at Erie Forge Company. Consult with us!



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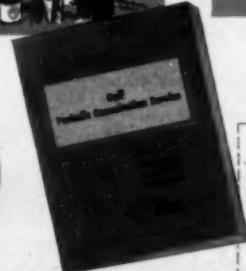
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in heavy duty Diesel and Gas Engines



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WITH PLENTY OF  
TENSION, BUT NOT BRITTLE



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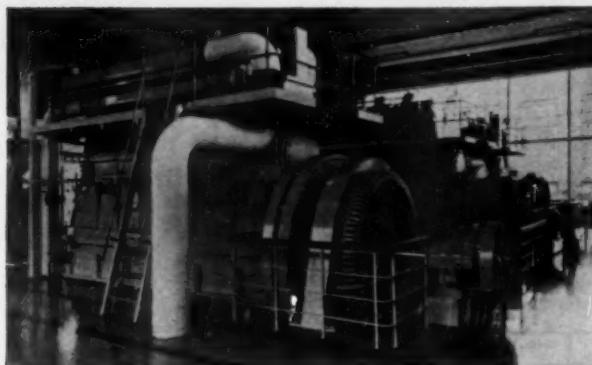
## Sealed Power

PISTON RINGS • PISTONS  
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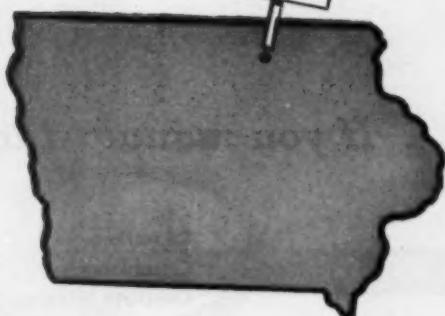
## STOP!

Let's take a quick trip to Osage, Iowa — and see how this progressive city provides dependable compressed air for starting its diesel powered municipal light and power plant.



## LOOK!

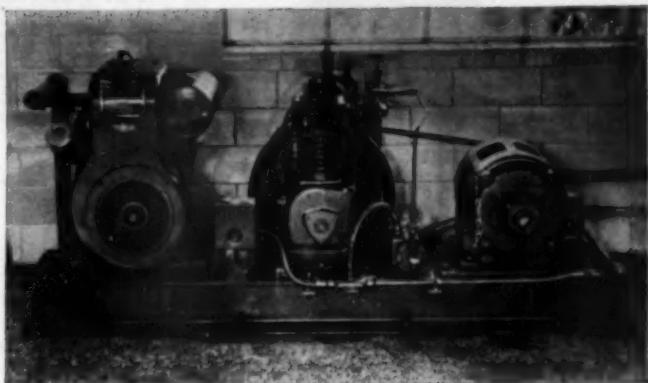
These three 730 h.p. diesel engines are the heart of the \$300,000 Osage power plant. All starting air is furnished by a single Gardner-Denver ADD Compressor.



## LISTEN!

The plant superintendent—writing about his Gardner-Denver Air Starting Compressor—says:

*"Engines have been started thousands of times. Compressor service has been flawless, and there has always been air at 250 lbs. pressure in the air tanks to start the engines. This compressor is used every day—never causing us any kind of trouble in any way."*



SINCE 1859

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Gardner-Denver Company, Quincy, Illinois

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Gardner-Denver ADD Compressors may be furnished with both electric motor—for normal operation—and gasoline engine—for positive starts when emergencies cut off all electric power.

Send today for full information on Gardner-Denver Compressors for diesel engine starting.

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**PETTER DIESELS will cut your costs  
and give you proved, dependable power!**



**MODEL AV2** — 4-cycle, 12 hp, 2-cylinder, 1800 rpm, vertical, water-cooled industrial diesel engine.

**PETTER AIR-COOLED DIESEL ENGINES.** Series AVA-3 to 10.5 hp in one and two-cylinder models. Air-cooled by flywheel fan and ducting over finned cylinders and cylinder heads. Light weight, low overall dimensions. Hand or electric starting. Full-speed drive from either end, or half-speed drive from timing-gear end. Totally enclosed, but easily accessible. Dependable operation under any climatic conditions. Direct injection with an open combustion chamber insures easy starting.

Type	HP Cont.	RPM	BORE in.	STROKE in.	LENGTH in.	WIDTH in.	HEIGHT in.	WEIGHT lbs.
AVA1	3/5.5	1000-1800	3.15	4.33	29.75	20.375	36.625	496
AV2	4/12	1000-1800	3.15	4.33	34.5	20.625	36.625	516
AVA3	12/18	1000-1800	4.33	4.33	33	34	41.375	1198
AV3T	18/27	1000-1500	4.33	4.33	39.125	34	41.75	1477
AV4T	24/36	1000-1200	4.33	4.33	45.75	34	41.375	1727

\*With radiator



**MODEL AVA2** — 4-cycle, 10.5 hp, 2-cylinder 1800 rpm, vertical, air-cooled industrial diesel engine.

1500 Petter Diesel Engines are produced each week . . . and stocks are held throughout the U.S.A.

Petter parts and service are available in over 100 countries . . . to service your equipment abroad.

Write us today for full facts as to why Petter Diesels will cut your costs and give your equipment proved, dependable power.



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# DIESEL AND GAS ENGINE PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

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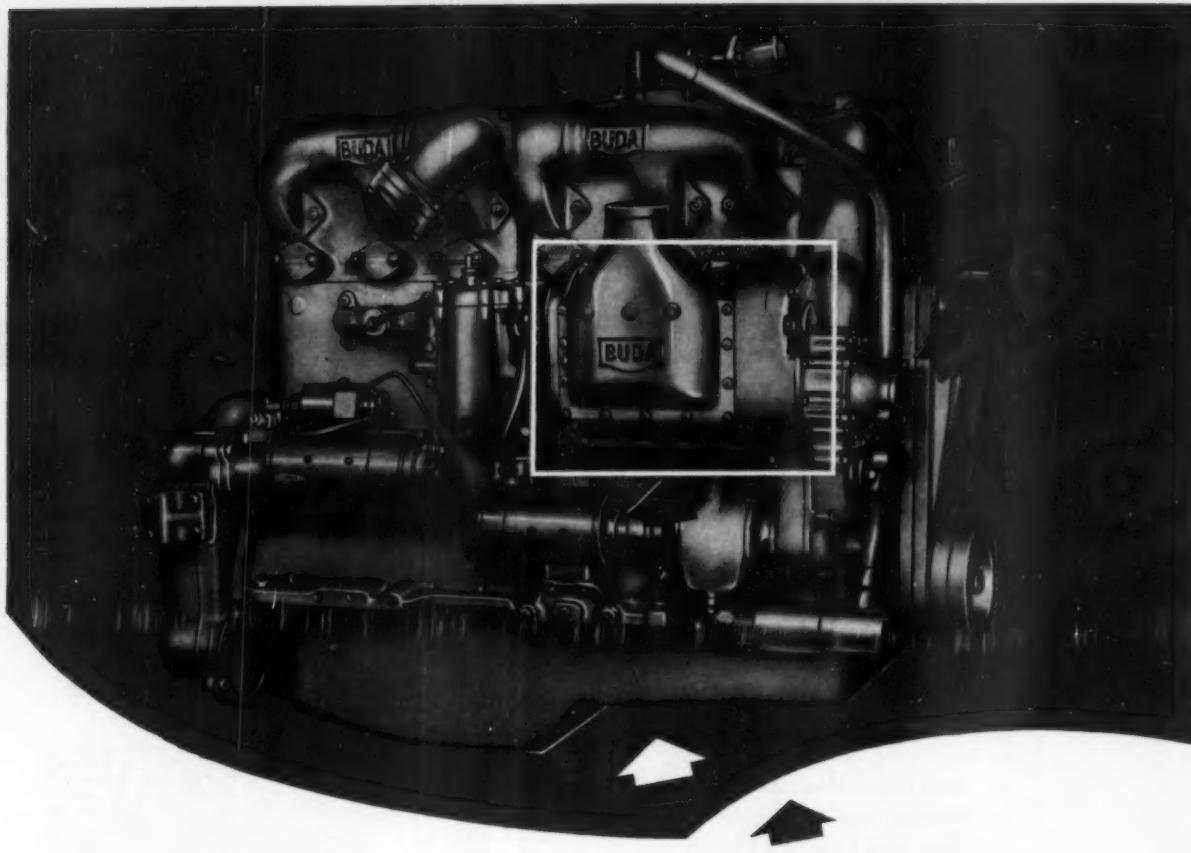
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### FRONT COVER ILLUSTRATION

Mr. Lyric A. Johnson operating Caterpillar diesel tractor pulling 75 ton



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**built in for added horsepower and economy**

The Buda Company of Harvey, Illinois, uses B-W Superchargers on their diesels. This automotive diesel engine, Model 6-DAS-844, develops 280 brake horsepower at 2,100 r.p.m. Designed for heavy-duty truck operation both at sea level and altitude. The supercharger on this engine is one of a standard line developed by PESCO Products Division.

For motor truck, marine, railway or general industrial applications, supercharging means savings in engine space and weight . . . means power to pull heavy loads . . . means sea level operation at high altitudes. All these extra benefits without corresponding increases in operating costs.

The engine manufacturer who wants to pack more power into a given engine size . . . or who wants to add an entire new series of models to his line without retooling or the expense of redesign, can do so simply by equipping his present line with B-W Superchargers. One of our engineers will gladly explain how this can be done. There is no obligation. Write today to:



**PRODUCTS DIVISION**

**BORG-WARNER CORPORATION**

24700 NORTH MILES ROAD

BEDFORD, OHIO

# MARTINAC COMPLETES "MONA LISA"

By CHARLES F. A. MANN

**W**ITH between 20 and 25 large Diesel and Douglas Fir tuna clippers slated to be completed in Tacoma's unique group of shipyards, the advent of the first large clipper each spring makes news—news for not only the fishing industry of San Diego and Central America, but the diesel and allied industries as well. Completed on schedule and of trim appearance, the big clipper *Mona Lisa* left Tacoma the last day of March for San Diego, her home port, only to make room for another and even larger clipper to be launched this summer.

*Mona Lisa* was designed by J. M. Martinac, founder and president of the J. M. Martinac Shipbuilding Company. The Martinacs, father and son, have successfully won a large place for themselves in America's wood and diesel shipbuilding industry, and, as in world war II, are again on the Navy's

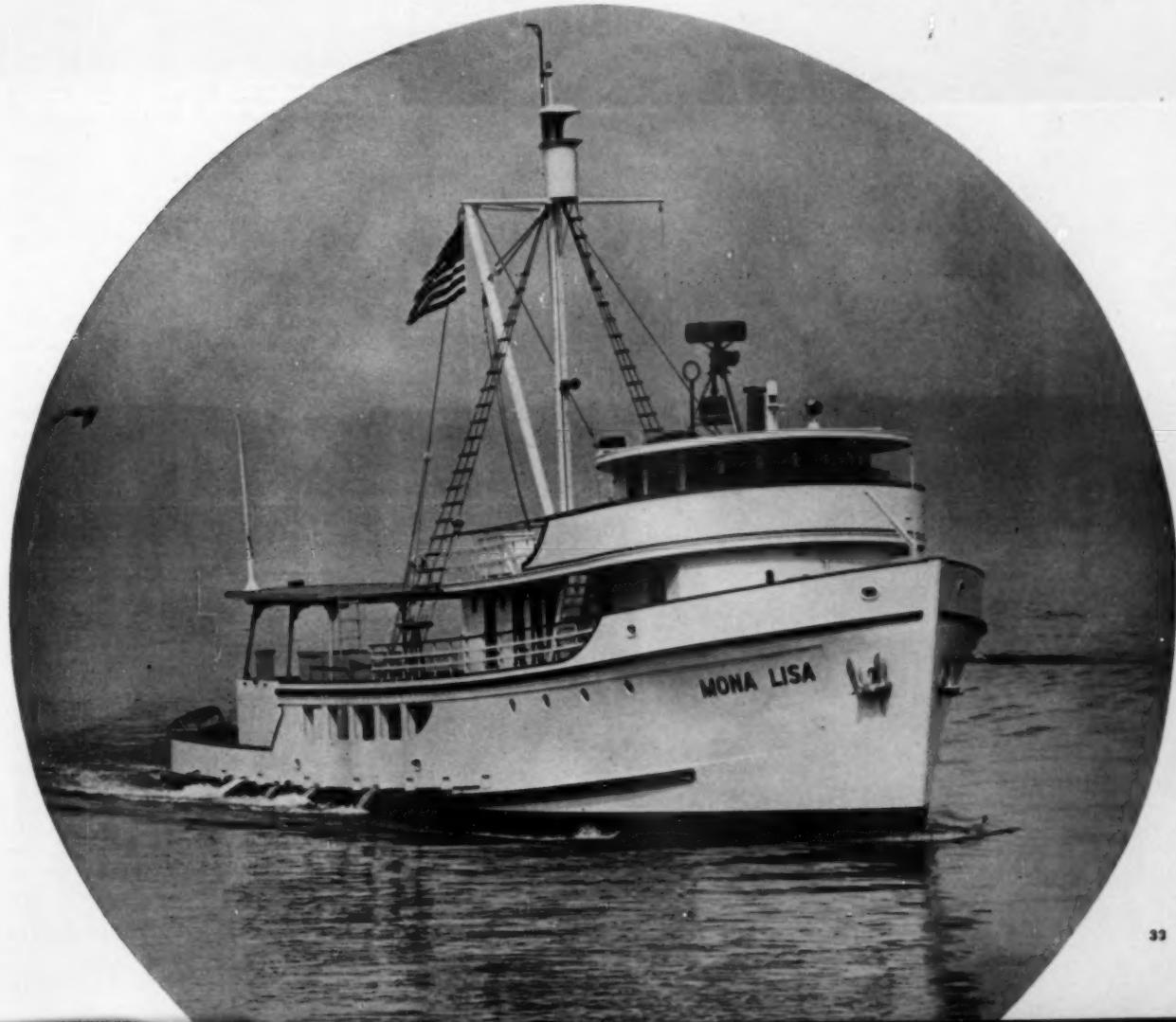
top nine boatbuilders' list, with three unique Navy craft about ready to go into production—or will go as fast as the ways are cleared of the present 1951 tuna clipper building program.

Mr. Martinac tried to retire after the last war, which had practically ruined his health, but late last year found him back in the saddle, with his pet hobby of designing practically all craft built in his company's shipyard, plus a unique, large new groundfloor drafting room-office-studio, where he can woggather ideas and greet friends, salesmen and customers in the old Martinac style.

*Mona Lisa* was designed and built for Joseph C. Correia and Associates of San Diego, and has principal dimensions of 118 x 26 x 13 ft. 6 in. Of trim lines and closely figured capacities, the clipper

will pack between 230 and 240 tons of frozen tuna in 10 wells and the 3-compartment deck bait box which, as customary, is refrigerated to pack live bait in cool seawater outbound, and frozen tuna on the return voyage. Main propulsion is an 8 cylinder 9"x12" 615 hp. fully enclosed Superior diesel, direct coupled, via a monel tailshaft, to a 3 bladed 39x66 inch Coolidge propeller. Auxiliary power is provided by a pair of three cylinder General Motors diesels developing 150 hp., and each driving a 100 kw. 120 volt a.c. generator and a 25 kw. d.c. generator, to give dual voltage electric supply for the whole ship.

The heavy refrigeration load is carried by the a.c. current supply, as well as all ships lighting, galley range, etc., while the deck winches, navigation equipment, radio and radar are all powered off





Looking across the top of the 8-cylinder, 615 hp. Superior Diesel main engine. Note two of the General Motors diesel auxiliary sets, one on either side.

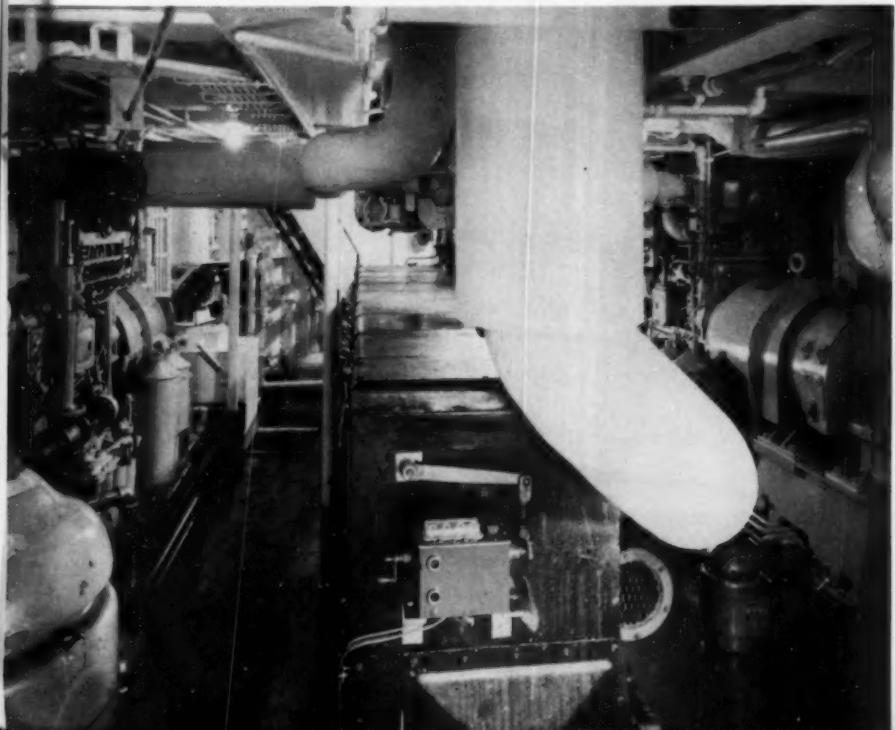


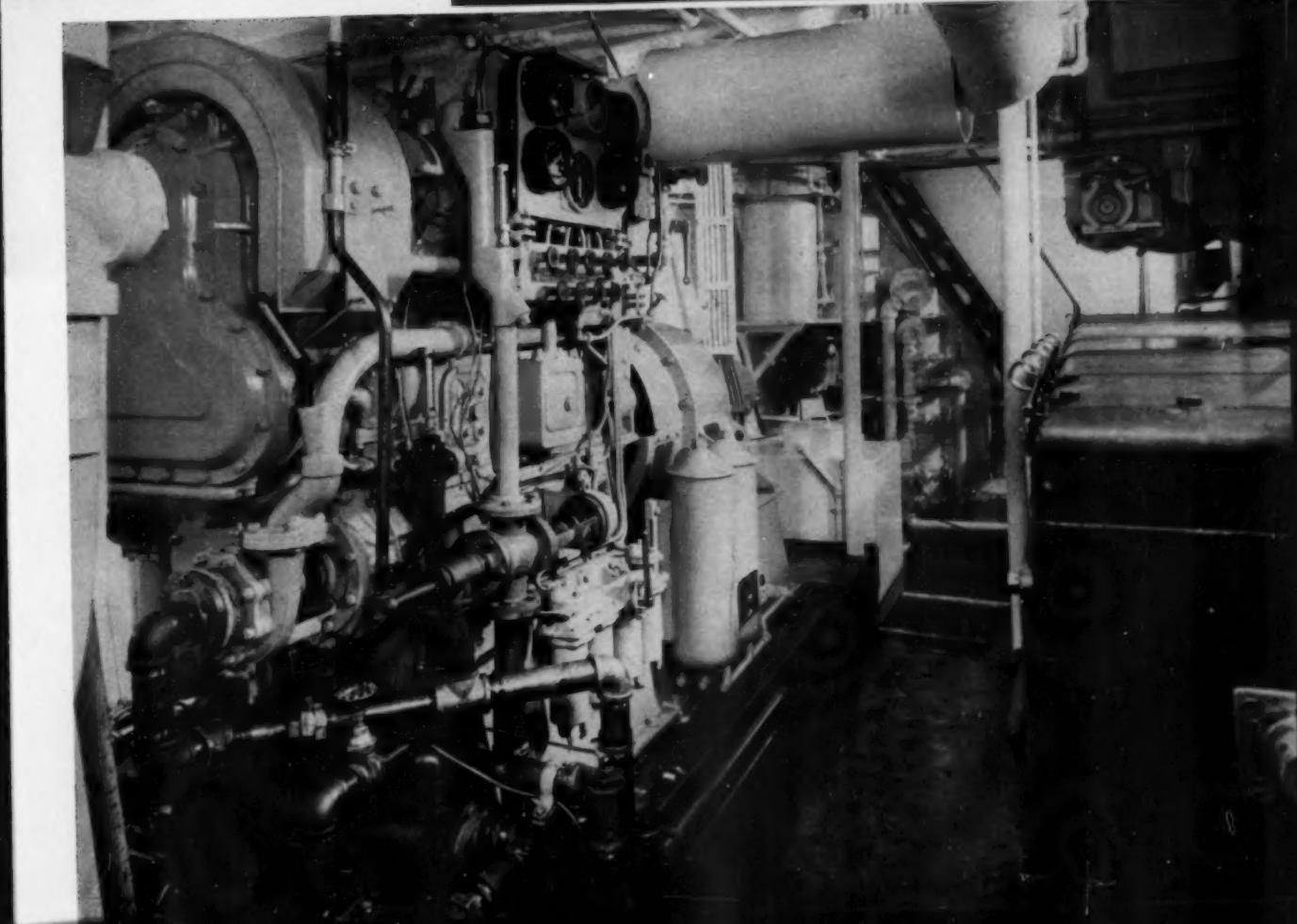
One of the General Motors 150 hp. diesel generating sets on the *Mona Lisa*. Note portion of the big Superior main diesel in right-hand bottom corner.

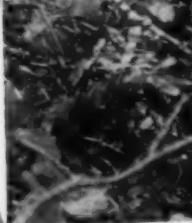
the d.c. portion of the electric supply. Auxiliary diesels are equipped with air starting to eliminate all secondary battery generated starting power. Both the main Superior and G. M. auxiliary diesels are cooled by fresh water in a thermostatically controlled circuit, using specially designed Wix (Seattle) shell and tube heat exchangers of large capacity, even when using muddy, warm seawater.

Navigation equipment is elaborate and compact, and features Sperry electric steerer and Sperry automatic pilot; a radar set and a 500 watt Pacific Electronic radiophone installation, Intervox direction finder, Submarine Signal's fathometer and the usual accessory items, including full pilot house engine control are fitted. The *Mona Lisa* will do 11 knots loaded, and carries a crew of 15 men, in addition to elaborate captain's quarters, with walk-in clothes closets and private office. The tank capacities, including steel-lined pair of fish wells, is 40,000 gallons of diesel fuel oil; 1200 gallons of lube oil; a 500 cu. ft. walk-in day refrigerator, and a 350 cu. ft. galley freezing compartment. Galley equipment includes heavy duty electric range; electric coffee making set; tile drainboards, magnesite floor, and a regular butcher's chopping block, beside innumerable built-ins. Rubber tile mess table is featured as well as radio outlets, forced air ventilation and quarters master switchboard, novel refinements not found on many clippers previously built.

The elaborate pump layout includes 2 large Fairbanks-Morse bait pumps and 12 2-in. Jacuzzi brine pumps; 2 5x5 inch Worthington ammonia compressors; a 6x6 and a 3x3 Worthington ammonia compressors, to give extra-large refrigeration capacity. A Driscoll Bros. tuna tender was supplied, while the Martinac Shipyard built the anchor winch and a Northern Line (Tacoma Boatbuilding Co. Inc.) cargo winch is fitted. Representing an investment of \$3,220,000, *Mona Lisa* will easily rank as one of 1951's finest giant size clippers. A twin is to be launched about the middle of May, for San Diego interests.









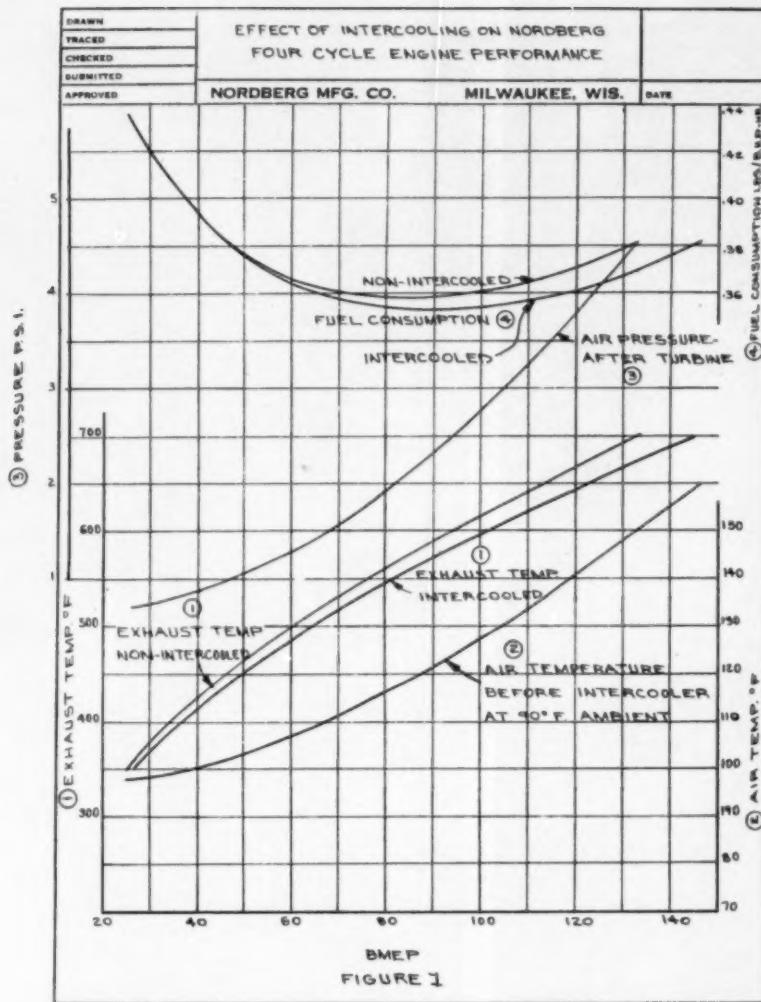
## DRAMATIC DIESEL LOGGING

**D**RAMATIC, high speed, economical log moving was the order of the day at the Gisle & Robstad 160-acre timber stand, ten miles east of Cave Junction, Oregon, on Highway 46, after the firm put a Caterpillar dieselized rubber-tired tractor to work in terrain where the grades run 20 to 33 per cent. In the early spring of 1950, Gisle and Robstad, contract loggers for Puget Timber Co. of Kerby and Eugene, Oregon, were asked to log a 160-acre tract of timber consisting of 6,000,000 feet of fir and pine. After a thorough survey of the mountainous hillsides, it was decided a truck road to the timber would cost far too much as there was a 2,000-foot elevation between the highway and the stand of timber. The estimated cost of a truck road to this timber was \$35,000, plus a three-dollar additional cost of trucking the logs to the mill 12 miles distant. As crawler-type tractors would be far too slow and costly to traverse the one and one-half miles distance between the truck landing and timber, a faster, more efficient means had to be found.

Having rubber-tired equipment in mind, the loggers took their yarding problem to the Crater Lake Machinery Co., Medford, Oregon, the local Caterpillar dealer, for assistance. The outcome was a DW10 tractor equipped with a Hyster winch and an Esco skid-pan. A bumper was constructed on the Esco pan to keep the logs from running into the DW10 as they sped down the steep grade. In loading, the DW10 lowers the skid-pan to the ground; the winching cable hooks to the chokers and pulls the logs on to the pan so the chokers do not rub on the ground. A load of 4,000 to 5,000 feet is taken to a turn. When the machine returns for another load, the skid pan is winched up off the ground. Two D7 tractors, equipped with No. 7's bulldozers, were used to gouge out a pioneer road one and one-half miles long with a grade ranging from 20 to 33 per cent. The rubber-tired tractor moves up the steep one and one-half miles in second gear. Coming down, in third or fourth gears, it makes the trip in 14 or 15 minutes. A

round trip is made in approximately 35 minutes. Daily production at the stand has an approximate average of 70,000 board feet. The logs are moved down the mountain at a cost figure of \$2.50 per M board feet. An Army half-track is used to transport the crew up and down the grade. On the down grade, the brakes on the half-track tended to burn up very rapidly. In order to eliminate this difficulty, logs were dragged behind this machine. This caused damage to the chokers so a skid-pan was attached to the half-track. This enabled the half-track to be used for yarding logs.

This new method of logging out a difficult stand has proved most satisfactory to Gisle & Robstad. They feel they have solved a specific problem and have paved the way for handling logs under similar conditions in the future. This proves again that American ingenuity teamed up with modern equipment and hard-working men can work wonders in the American tradition.



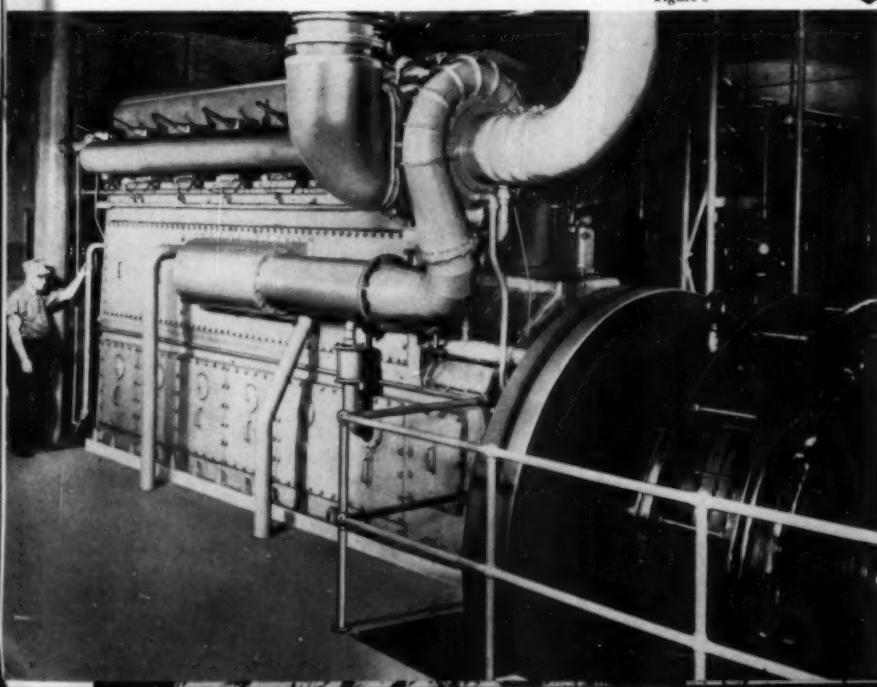
## Intercooling Supercharged Diesels

Next to improvements that added to the dependability and better performance of the diesel engine, designers have long endeavored to increase the power that could be obtained from an engine of given size and speed. To see the progress that has been made, it is only necessary to compare the overall dimensions, weight and output of an early engine with a modern diesel.

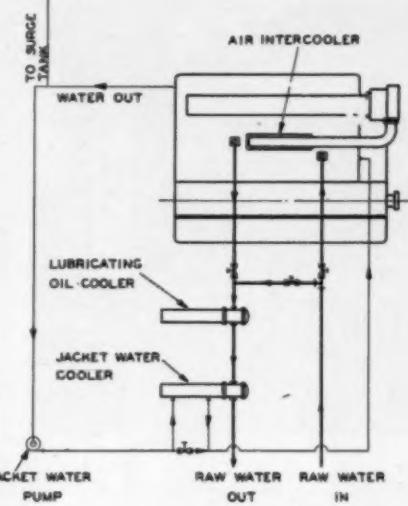
One of the more important advances made in obtaining increased power output was the application of supercharging. It is now common practice with most builders to supercharge four-cycle diesel engines. The advantages of supercharging result from the fact that more air can be forced into the cylinder than is possible with a naturally aspirated engine and more fuel can be burned with a resultant proportional increase in power at no higher combustion temperature. One of the factors that makes this possible is that a considerable amount of air cooling is obtained by allowing cool intake air to blow through the cylinder during a part of the exhaust and early part of the intake strokes, thus carrying more heat out with the exhaust. By increasing the power through supercharging, a given engine will have less weight per horsepower more power for the space occupied, will cost less per horsepower for engine and its installation, and will have an improved fuel consumption over the entire range. In supercharging Nordberg diesel engines, an exhaust gas driven turbocharger is driven by the exhaust gases and takes no power from the engine.

There are two systems of supercharging — low pressure and high pressure. Only low pressure supercharging is considered here since it is more commonly used at the present time. Most modern design diesel engines, although structurally able to carry far greater horsepower, have reached the point where their safe rating for continuous service is determined by the ability of the surfaces in contact with the combustion gases to stand the temperatures without heat failure or destruction of piston ring lubrication. Non-supercharged, four-cycle engines of modern design are rated at about 80 lb. bmepl while low pressure supercharged engines operate at about 120 lb. bmepl in continuous service. Many hundreds of thousands of horsepower in diesel engines in successful service have proven these ratings to be conservative.

The Diesel Engine Manufacturers Association Standards provide that diesel engines shall be rated on the basis of 90 deg. F. intake air conditions. To maintain the same average combustion temperature and heat load to the cooling water it is necessary to reduce the engine rating about 3% for each 10 deg. in intake air temperature above 90 deg. F. It follows therefore that engine rating



JACKET & RAW WATER  
COOLING SYSTEMS



— RAW WATER SYSTEM  
— JACKET WATER SYSTEM

FIGURE 2

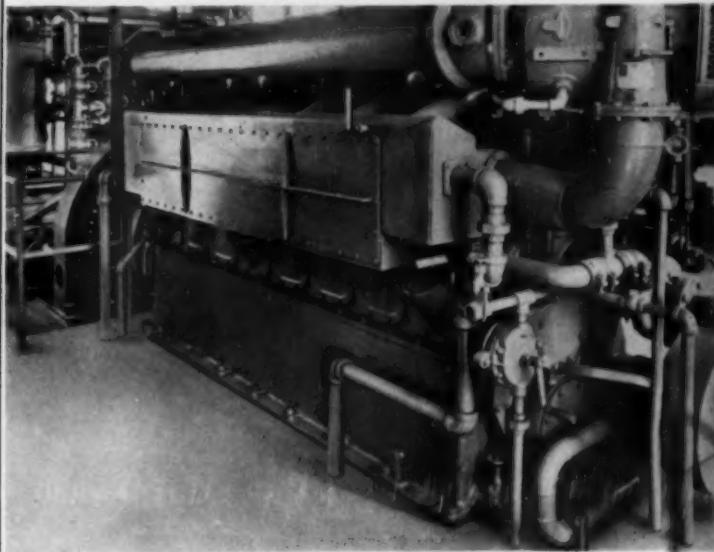


Figure 4

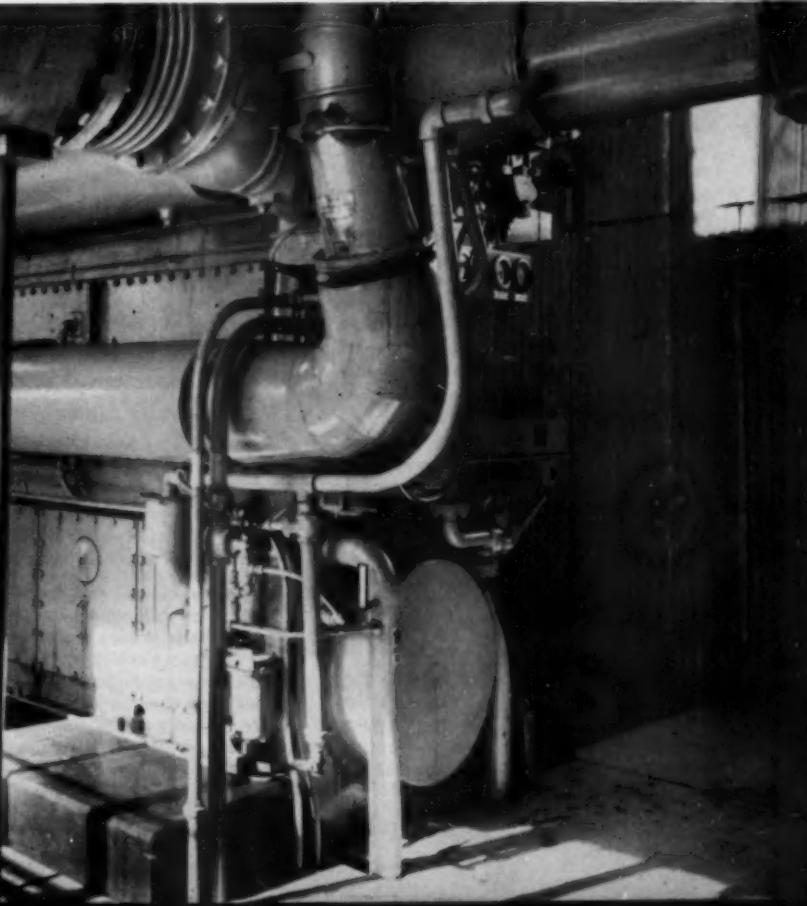


Figure 5

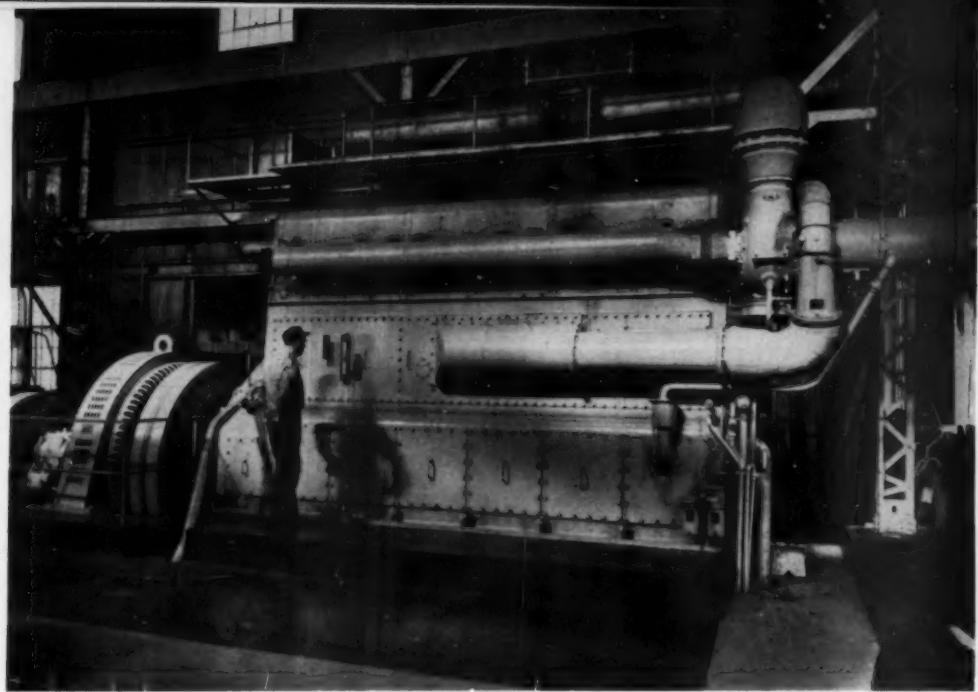


Figure 6

can be increased about 3% for each 10 deg. F. in air temperature below 90 deg. F. High intake air temperature affects the engine rating in two ways. First, there is less air available to burn the fuel because the density and weight of air in the cylinder decreases with increasing temperature; and second, the average temperature during the combustion stroke increases about two degrees for each degree increase in intake temperature. Thus—less fuel can be burned (less horsepower produced) before the maximum safe temperature is reached.

The low pressure turbo-supercharged diesel engine could be rated 15% higher with equal conservativeness except for the fact that in increasing the air pressure to  $3\frac{1}{2}$  or 4 pounds, the intake air temperature rises from 90 deg. F. at the blower intake to about 140 deg. F. at the blower discharge. Thus—the higher air temperature detracts considerably from the advantages of  $3\frac{1}{2}$  to 4 pounds air pressure. It is obvious from the above that the next step in increasing the rating of a supercharged diesel engine is to cool the intake air after the supercharger. If cooling water is available at a temperature which will permit bringing the intake manifold air temperature back to 90 deg. F., the rating of the engine can be increased 15% with no increase in average combustion temperature or heat load to the water jackets. This can be done by a simple, finned tube type of air-to-water heat exchanger built into the engine and through which the cooling water is circulated before going to the engine jacket water cooling system. An economical design of intercooler will reduce the intake manifold temperature to within 15 deg. F. of the water temperature. Thus—90 deg. F. water to the intercooler will result in 105 deg. F. air temperature to the engine. Since the normal rating of the low pressure supercharged engine is based on 140 deg. F. air temperature to the engine the use of the intercooler permits an increase in rating of 10.5%.

$$140^\circ - 105^\circ = 35^\circ \times 3\% = 10.5\%$$

10

While a non-intercooled engine must be derated for intake air temperature above standard conditions of 90°F., the intercooled engine is independent of intake air temperature and its rating is determined by the water temperature to the intercooler. For example, a non-intercooled engine installed where summer temperatures reach 110°F. must be derated 6% in horsepower. Under these conditions the manifold temperature after the supercharger will be 163°F. By applying an intercooler and using 90°F. cooling water the manifold temperature will be reduced to 105°F. Thus—as in the preceding example, the engine can be rated 10.5% above the normal rating for a non-intercooled engine operating with standard conditions of 90°F. intake air.

The effect of supercharging and intercooling on the ratings of 16 inch bore, 22 inch stroke, 327 rpm. 4-cycle stationary Nordberg diesel engines is shown in the following tabulation:

No. of cyl.	Non-Super-charged 80 bmeep.	Super-charged 120 bmeep.	Supercharged Intercooled 132 bmeep.
5	730	1090	1206
6	875	1310	1440
7	1020	1530	1680
8	1165	1750	1920

The rating shown for the supercharged, intercooled engines is based on 90°F. water to the intercooler and 105°F. air temperature to the manifold.

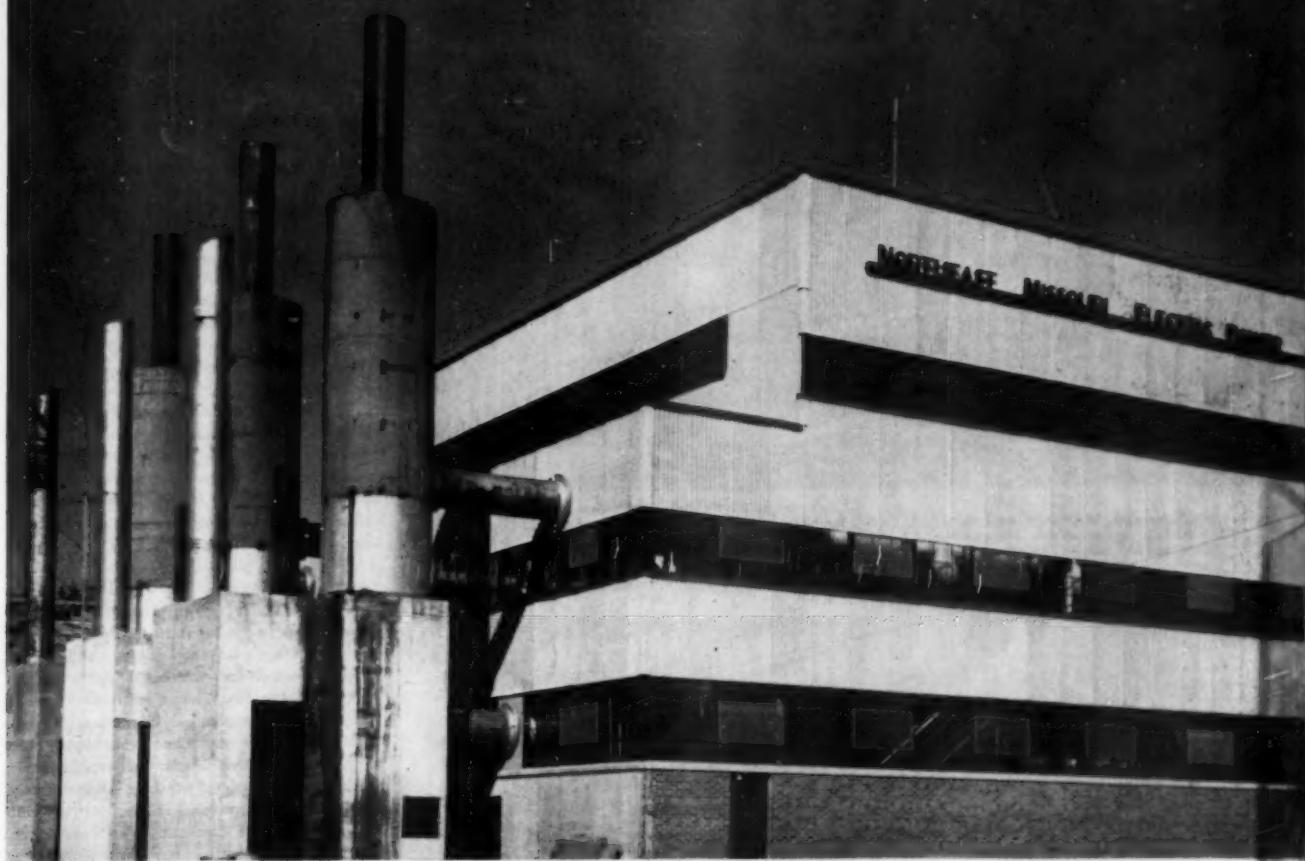
The curves in Figure 1 show the effect of intercooling on four-cycle supercharged Nordberg engine performance. A schematic arrangement of the jacket and raw water cooling systems of a supercharged intercooled engine is shown in Figure 2. Typical applications of four-cycle supercharged and intercooled Nordberg diesel engines are the installations at Menasha, Wisconsin Municipal Power Plant, Figure 3, and the Owens-Corning Fiberglas Corporation, Santa Clara, California Figure 4. At Menasha a six-cylinder, 16 inch x 22 inch supercharged and intercooled Nordberg diesel engine, operating at 300 rpm. has been in service since 1946. The eight-cylinder, 9 inch x 11½ inch supercharged and intercooled Nordberg diesel at Owens-Corning Fiberglas Corporation develops 720 hp. at 720 rpm.

Fiberglas Corporation, Santa Clara, California Figure 4. At Menasha a six-cylinder, 16 inch x 22 inch supercharged and intercooled Nordberg diesel engine, operating at 300 rpm. has been in service since 1946. The eight-cylinder, 9 inch x 11½ inch supercharged and intercooled Nordberg diesel at Owens-Corning Fiberglas Corporation develops 720 hp. at 720 rpm.

At the Arizona Edison Company plant at Miami, Arizona, power losses due to both high altitude and high temperature were compensated by the use of intercooling in conjunction with a slightly higher supercharged pressure. These engines (Figures 5 and 6), are installed at an altitude of 3500 feet which would normally require that they be derated 8% due to the lower density of the air. An additional loss of 4½% results from air temperatures of 105°F. during the summer. To compensate for these losses totalling 12½% of the engine ratings, superchargers were designed to give a higher manifold pressure. While the higher supercharger pressure restored manifold air density to sea level conditions it caused the air temperature in the intake manifold to increase to 188°F. which would cancel all of the benefits of the higher pressure. An intercooler using 125°F. water reduced the manifold air temperature to 140°F. With air density and temperatures restored to normal sea level conditions no derating was necessary. The same intercooler supplied with 90°F. cooling water would permit rating the engines at 10.5% above normal rating for 90°F. air and sea level conditions.

There are many applications where intercooling can be used to provide an increase in horsepower at small additional cost and without any increase in space or foundation requirements. Water for intercooling can be either fresh or sea water. The latter is particularly advantageous where engines are installed on tidewater in tropical climates.

## A CO-OP WITHIN A CO-OP



A big modern structure houses the diesels at the South River Station of the Northeast Missouri Electric Cooperative. Intake air passes through Continental self-cleaning filters in concrete housings. Exhaust gases pass through vertical Maxim silencers.

### Northeast Missouri Electric Power Cooperative Puts Three 3,500 HP. Fairbanks-Morse Diesels into Service to Supply Six REA Member Co-ops

By M. W. BOUDREAUX\*

THE Northeast Missouri Electric Power Cooperative, one of the nation's newest and largest rural power co-ops, has put into service a new 10,500 hp. diesel plant embodying three of the largest Fairbanks-Morse diesels ever built. This unique power plant is the first generating unit in a great system which ultimately will serve 55,000 farm homes in 27 counties of north-east Missouri and south central Iowa. This broad area has not had in recent years a power supply adequate to meet the growing demand. Rural electrification cooperatives secured much of their power from municipal plants but the short supply seriously restricted load development. To meet this situation six distribution co-ops formed in 1948 a non-profit power cooperative designed to meet all their

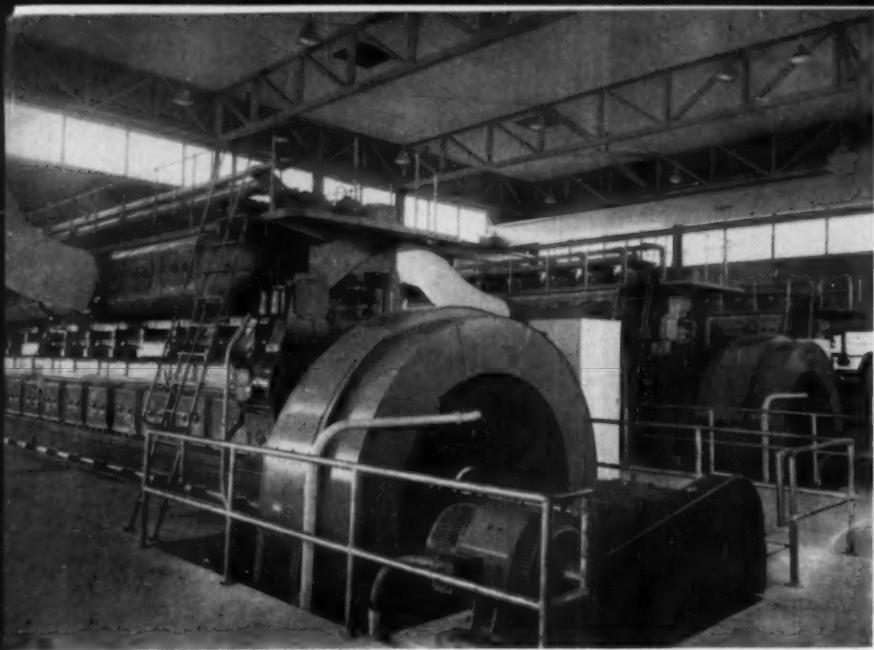
generating requirements. The power co-op would build, own and operate such generating systems as proved necessary, a 69,000-volt transmission system from the plants to the member co-ops' load centers, and the substations at these centers to step voltage down to 7200.

First power fed into the distribution system came from the Bureau of Mines' coal-to-oil demonstration plant at Louisiana, Mo., which has generating capacity far exceeding its current requirements. Next, the power co-op proceeded with all possible speed to design and build its own major generating station on the west bank of the Mississippi about seven miles northeast of Palmyra, Mo. This site provided uncommonly good accessibility for the transportation of fuels. Docking facilities under construction will permit fuel delivery by barge. A spur was built to tie the plant to a main rail line.

A transmission line of a major natural gas pipeline company actually crosses the co-op's property.

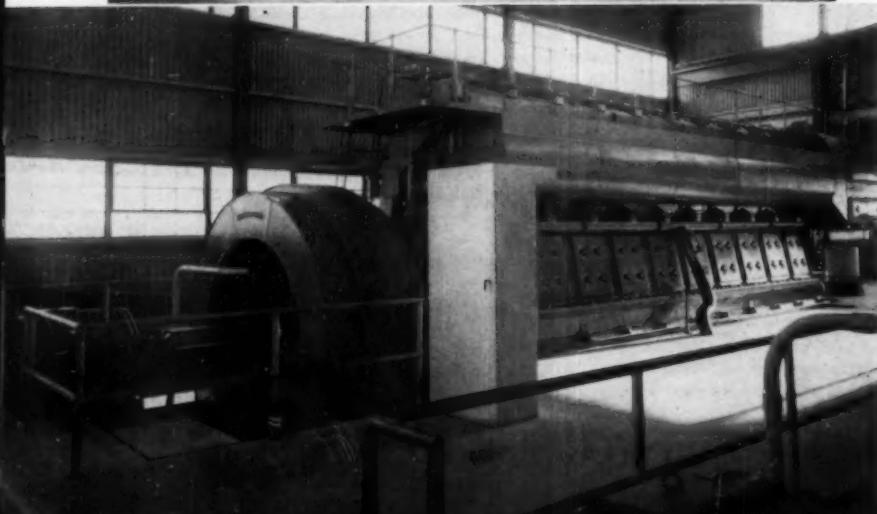
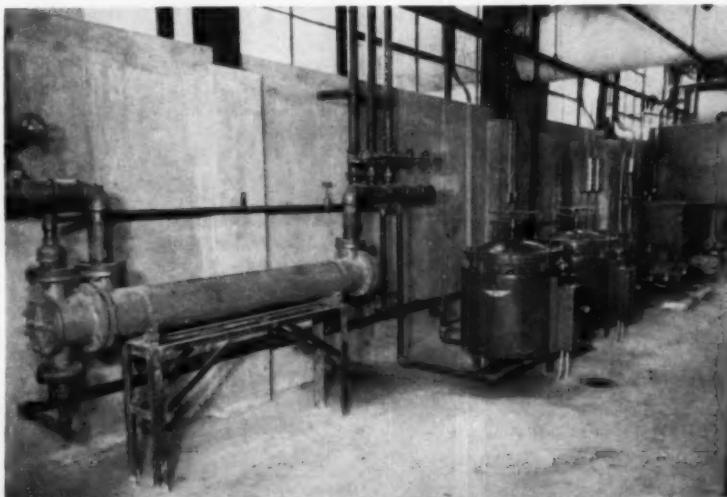
South River Station is a dual power plant: first, a 10,500 hp. diesel plant, second a 15,000 kw. high-pressure steam turbine plant. When completed the steam plant will carry base load with the diesel plant taking the peaks and providing standby protection. Actually the diesels may be destined for 24-hour operation. The first engine was put on the line for test purposes July 29, 1950. The three-engine plant was officially energized on October 20, 1950. By April 1951 the diesel plant was on the line 24 hours a day as base load generators pending completion of the steam plant. But rural load is growing faster than anyone believed possible and it is conceivable that the demand will require continuous operation of the diesel plant for years to come.

\*General manager, Northeast Missouri Electric Power Cooperative.



Fuel handling equipment includes a Ross heat exchanger, two Hoffman filters and a pair of Viking transfer pumps.

South River Station has three 3500-hp. Model 31AD18 Fairbanks-Morse diesels, three of the largest F-M engines ever built. The big engines drive 2480 kw. Fairbanks-Morse alternators producing 3-phase, 60-cycle, 4160 volt current.



In designing the three-engine plant the Stanley Engineering Co., consulting engineers, kept two objectives in view: a plant that could be put on the line quickly to carry surging peaks or compensate for the failure of other power supply; a plant that could produce kilowatt hours dependably and at low cost in long arduous service. Diesels of course are ideal standby units since they can be started quickly. In this plant equipment and controls are arranged so that the engines can be put on the line in less than a minute from a cold start with no input of power to the plant. Starting air bottles are kept up to 250 psi. by an automatically controlled motor-driven compressor but a gasoline engine can be used to run the compressor if no power is available. The switchboard is in a partitioned, glassed-in control room overlooking the engine room and holds all the switches, meters and other instruments necessary to control the engines and the electrical system. The engines chosen are 3500 hp., 10 cylinder, Fairbank-Morse dual-fuel units which develop their rated horsepower at 277 rpm. Each 2-cycle engine drives a 2480 kw., Fairbanks-Morse alternator with a 50 kw. chain driven exciter. Plant designers saw to it that the big heavy-duty 284,000 lb. diesels had good, well-arranged accessory equipment to insure trouble free operation.

The plant is designed for virtually automatic handling of lubricating oil. There is an 800-gal. clean oil tank in the basement for upper cylinder lube with a motor-driven pump to transfer lube through a meter for each engine to individual 100-gal. supply tanks. From these tanks the oil is pumped to two mechanical lubricators for each engine. There is a return line to the supply tank to maintain oil level in the lubricators. These are wet sump engines requiring approximately 1000 gallons for the original fill. Bearing lubricant is drawn from the crankcase by a motor-driven positive displacement pump which discharges through an oil cooler and strainer to the bearings. The lube flows up through the connecting rods to cool the pistons and returns to the sump by telescopic lines. There is a cellulose-type filter for each engine. When the engine is in operation soem lube is by-passed through the filter from the pressure system. When the engine is not running, a motor-driven pump draws oil from the crankcase and puts it through the filter. The plant has an 1800-gal. dirty oil tank so that lube can be drained for batch purification if necessary. There is an auxiliary lube pump driven by either a motor or a gasoline engine. Pressure in the lube header is maintained at 30 lbs. and temperature is kept between 155 and 165 deg. F. by a modulating valve regulating the flow of water through the oil cooler. Initially, the cylinder lube handling will not follow the described pattern because the operating staff wants to try a different lubricating oil in each engine. When a reasonably long use test demonstrates the superiority of any one oil the entire plant will be switched to that lubricant and the automatic features of the lube handling system will be utilized.

Another view of the giant trim-lined F-M engine showing the intake header and alternator with chain-driven exciter.

The engines are designed as dual-fuel units to burn natural gas with a small quantity of pilot oil but are currently being operated as oil-burning diesels pending the completion of the gas line that will bring natural gas to the plant. Fuel oil is unloaded by a 100 gpm. motor-driven rotary pump into three 50,000-gal. vertical cylindrical tanks 700 ft. from the plant, first passing through an air eliminator and a meter. From storage, the fuel flows by gravity to the suction of two motor-driven transfer pumps which put the oil through a heat exchanger and a pair of cellulose filters into a 17-lb. header. From the header there are lines through separate meters to 150-gal. day tanks for each engine. The transfer pumps run continuously and float-controlled valves admit oil to the day tanks as necessary. Fuel is picked up from the day tank by the engine's own supply pump and fed through a header to the injection pump at each cylinder. For dual-fuel operation, there will be separate fuel pumps to meter accurately the small charges of pilot oil. As a dual-fuel, the engine can be switched instantly from oil to gas or from gas to oil. The switch will be automatic in case gas pressure fails. The governor is arranged so that half its travel controls gas admission, the other half fuel oil for full diesel operation. From our operations thus far, we are satisfied with engine efficiency. We are using a 33.6 API fuel oil for which the delivered price is 10 cents a gallon. We estimate that on dual-fuel operation, our total fuel cost will be under 4 mills per kw. hr.

The Mississippi will be an important water source for the steam plant, but wells provide a more convenient supply of clean water to cool the diesels. Three motor-driven well pumps supply 425 gpm. each to the raw water header from which water flows through modulating valves to the oil coolers and heat exchangers and then to waste. The engines are cooled by a closed system with well water circulated by three motor-driven centrifugal pumps through the exchangers and the engines. Some of the jacket water is drawn off to the fuel heat exchanger to warm the fuel and then returns to the engine inlet header. There is a surge tank for each engine and all are tied to a header which serves to keep all the engines warm if one is running. What little makeup water is required is treated in a softener and pumped into the surge tank. There is also one well and a service tank for potable water for building use. Scavenging air for each engine is drawn through an automatic self-cleaning filter in an air house outside the plant. A 2 in. vacuum is maintained in the crankcase. There are dual exhaust headers, each serving five cylinders. The exhaust lines join and vent through a vertical silencer mounted on the air house.

Both for operating ease and engine protection, the plant has particularly complete instrumentation. The main switchboard includes voltage regulators, governor controls, synchroscope, oil circuit breakers, field switch, temperature indicator, ac. and dc. voltmeters and ammeters, kw. meters and time-hour meters which are energized when the field switch is closed. In the engine room there is a panel holding pressure gauges on the starting air header, the fuel oil header, cooling water header, and cooling water suction. This panel also has control switches for the two fuel transfer pumps, two lube transfer pumps

and three water pumps. There are alarms on low fuel pressure, low air pressure and softener regeneration. Finally the board has level meters on the fuel storage tanks. There is a separate gauge panel beside each of the three engines with a multi-point exhaust pyrometer and gauges on fuel, lube, starting air, jacket water and gas. Switches control the water pump, lube pump and lube purifier pumps. There are alarms on low lube pressure, high lube temperature, high jacket water temperature, low jacket water pressure, low gas pressure, and high and low day tank level. There is a kw. meter on each engine panel. All pilot lights, alarms, circuit breakers and emergency lighting are on a dc system supplied by a 120 volt battery set.

Though we have tried to engineer efficiency and safety into the plant, we recognize that good operating personnel is essential to long, successful operations, and have made every effort to assemble a highly competent, experienced staff. E. E. Holwick is South Station plant engineer. For the entire system, J. E. Shaw is chief of operations, H. R. Jackson, construction and maintenance engineer, Richard Breckenkamp, system electrical engineer, Arthur Hunter, central station electrical engineer, W. V. Pendleton, office manager. The author of this article serves as both General Manager and Chief Engineer.

The large area served by our six REA cooperatives in rapidly-developing dairy country, mostly in the St. Louis milkshed. In the past, the farmers of this area have been discouraged in their use of electric light and power. The power supply was limited and service was poor with voltage drooping as low as 90 volts. Today the modern farmer is building an electrified home and also an electrified farm. This combined domestic and business use is raising his consumption to the level of small industrial plants. Our power co-op is endeavoring to provide the dependable, low-cost abundant, power supply necessary to the region's development. In our transmission system, we are building two great loops with dual feed so that, in the event of a break in the line, the break can be isolated and power fed

in the reverse direction to the major portion of the system. In our generating system, we have emphasized rugged dependability and operating economy. It should be emphasized that this is a private enterprise which pays every tax paid by any utility except a profits tax—and we don't pay that because we are a non-profit organization. The six REA cooperatives that own this big power co-op setup are: Missouri Rural Electric Cooperative, Macon Electric Cooperative, Lewis County Rural Electric Cooperative, Ralls County Electric Cooperative, Tri-County Electric Cooperative, and Southern Iowa Electric Cooperative. Officers of this multi-million dollar power system are: R. D. Pennewell, president; Charles D. Miller, vice-president; and F. H. Schmit, secretary-treasurer.

#### PRINCIPAL EQUIPMENT LISTING

Northeast Missouri Electric Power Co-op diesel plant—South River Station, Palmyra, Mo.

Engines:—Three 3500 hp., 10 cylinder, 18 x 27 in., 2-cycle, Model 31AD18, dual-fuel engines developing hp. at 277 rpm., Fairbanks, Morse & Co.

Alternators:—Three 2480 kw., 3 phase, 60-cycle, 4160 volt, Fairbanks, Morse & Co.

Lubricating oil:—Rotella and Talpa. Shell Rubidene, Sinclair Refining Co. Ursa X and Ursa P. Texas Co.

Lubricators:—Madison-Kipp Corp.

Lube Oil Filters:—United States Hoffman.

Lube Oil Pump:—Blackmer.

Oil Cooler:—Ross Heater & Mfg. Co., Inc.

Lube Oil Strainer:—Elliott Co.

Well Pumps:—Pomona; Fairbanks, Morse & Co.

Jacket Water Pumps:—Fairbanks, Morse & Co.

Fuel Oil Filters:—United States Hoffman.

Governors:—Woodward Governor Co.

Intake Air Filters:—Continental Air Filter Co.

Piston Rings:—C. Lee Cook Mfg. Co.

Silencers:—Maxim Silencer Co.

Air Compressors:—Gardner-Denver Co.

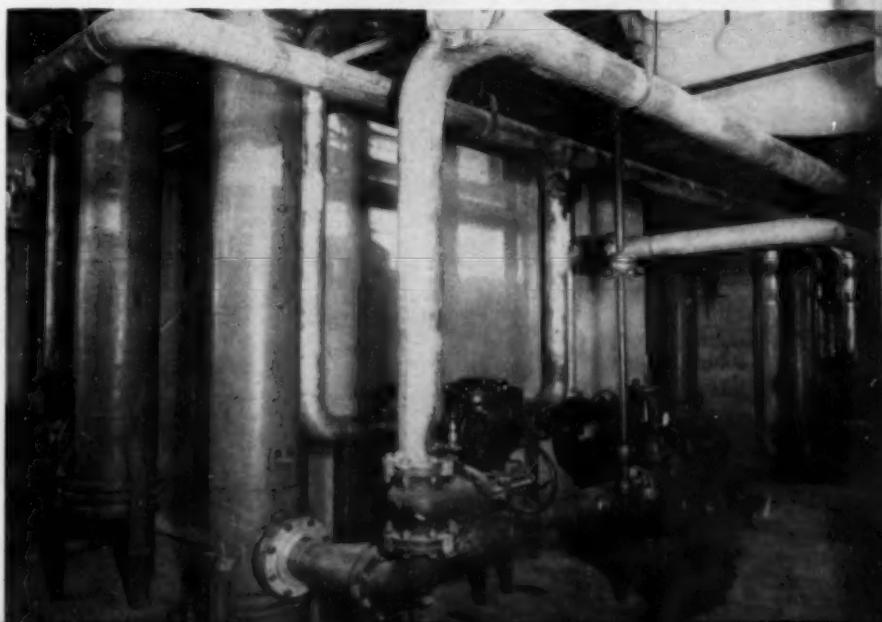
Switchboard:—Westinghouse Electric Corp.

Batteries:—Gould-National Batteries, Inc.

Heat Exchangers:—Ross Heater & Mfg. Co., Inc.

Pyrometer:—Alnor, Illinois Testing Laboratories.

Included in the lube system of each engine is a Ross oil cooler, and Elliott strainer and Blackmer motor-driven circulating pump. Also shown in this picture is the Ross cooling water heat exchanger.



# DIESELS ON BIG SCALE FARMING

**B**ROTHERS Carl J. Rexroth and Robert E. Rexroth, contractors of Bakersfield, California, whose firm name Rexroth & Rexroth is well known all over California, also operate a 12,000-acre ranch. They came to this ranch operation naturally because among their dirt-moving contracts are many farm jobs such as land leveling for irrigation, ditching, subsoiling, and so on. Two of their five new TD-24 diesel tractors, the largest in the International crawler line, are used on the ranch. One of these is shown pulling a wide-cut squadron disk harrow with 26-inch disks in a big summer-fallowed field.

This 12,000-acre ranch retains the name given it in the original Spanish grant, *Las Yequas* (the mares), which Bob Rexroth said is probably older than the name "California." The name was derived from the fact that in the olden days numerous herds of wild horses roamed the country. It is located in the rough country called the Coresa Plains west of Bakersfield and 60 miles east of Santa Margarita, which is its post office address. Some 4,000 acres of the ranch is in cultivation, one-half always being in summer fallow and the other in Barley wheat, which averages 20 to 25 bushels to the acre. The fields are all very hilly and it takes plenty of power such as provided by the diesels to pull the heavy tillage equipment, the big twenty-foot combines, and the gangs of drills up and down steep inclines that prevail on this unusual ranch to produce crops. Over 40 miles of well-maintained roads have been built on the ranch, which greatly facilitates the movement of heavily loaded trucks from any part of the ranch during harvest time. The ranch is 12 miles long and one-half to four miles wide.

The Rexroths have a herd of 450 Herefords on the ranch, of which ten are registered bulls. Wheat is planted by two gangs of McCormick 10-12 drills with fluted feed in 10-inch spacings and 21 pounds of seed per acre. An important farm job also frequently performed by the Rexroths on contract is deep subsoiling to break the hardpan and thus facilitate water penetration, especially for such deep-rooted crops as alfalfa. Here again much power is required as is provided by the 148 drawbar horsepower diesel shown in accompanying illustrations pulling a heavy-duty ripper 54 to 60 inches deep. This outfit is shown on the irrigated farm of Marvin Bender, near Edison, seven miles east of Bakersfield.

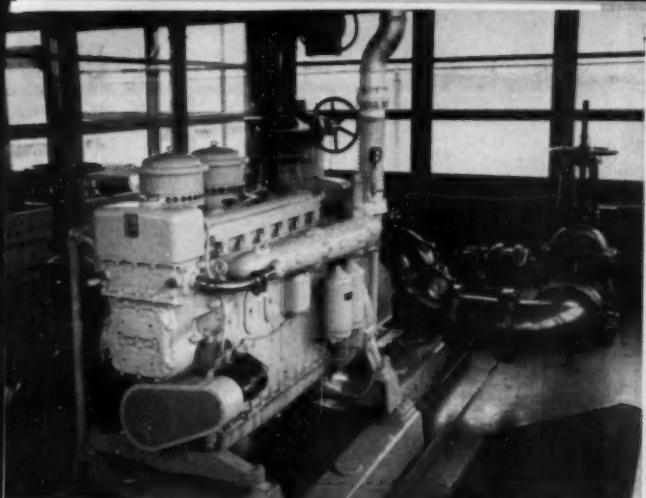




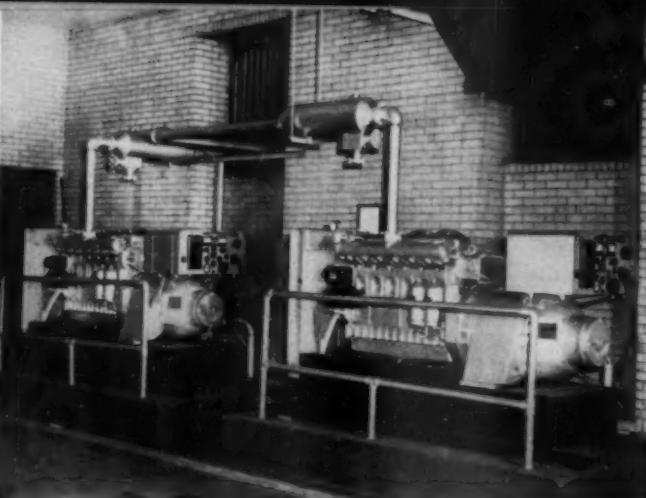
International TD-24 diesel crawler on the 12,000 acre ranch operated by the Rexroth Brothers of Bakersfield, California.

Another International TD-24 owned by the Rexroth's pulling a heavy-duty ripper (34 to 60 inches deep) in a 40-acre field near Edison.

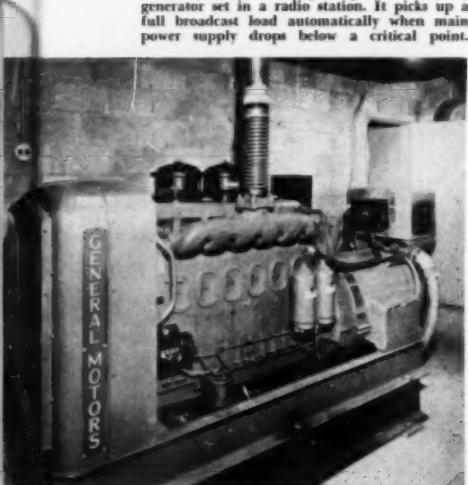




This 6-cylinder GM diesel engine and Dayton-Dowd pump operates on an emergency standby basis in a defense plant. It has automatic controls operated by a drop in water pressure in the plant and builds up a pressure of 125 pounds within seconds after diesel takes over.



Two 6-cylinder GM diesel engines safeguard the operations of a large city bank. In an emergency, driving standby generators, they can power 75 per cent of the bank's lighting equipment, keep money counters, wrappers, office equipment and a 7-ton steel door in operation.



This 6-cylinder diesel engine operates a standby generator set in a radio station. It picks up a full broadcast load automatically when main power supply drops below a critical point.

## EMERGENCY DIESELS

Modern diesel engines have helped solve power problems in many fields but probably no work they do today is more significant than that of safeguarding the public from loss during emergencies. Among the first to use these engines as sources of emergency standby power were telephone companies and radio broadcasting stations. The use of these engines for this purpose has now increased and it is common to find them operating standby power or pumping units also in defense industries, hospitals, prisons, banks and water departments. It is true, however, that before diesel engines could become adaptable for use in smaller standby installations, drastic reductions had to be made in their size and weight. These reductions, together with the inherent advantages of basic diesel principles of operation account for their growing recognition in this field.

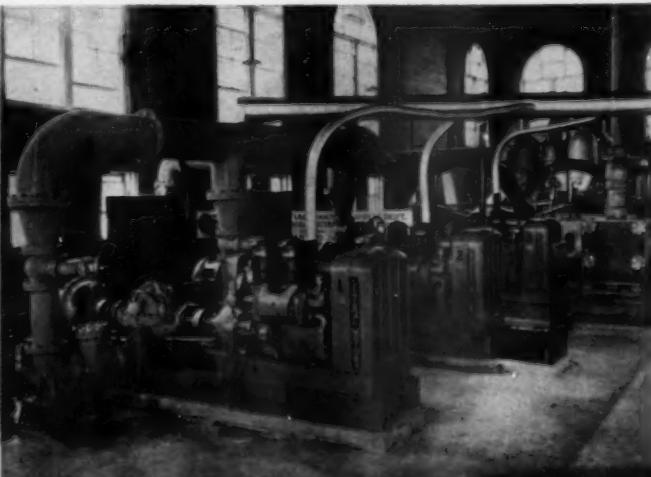
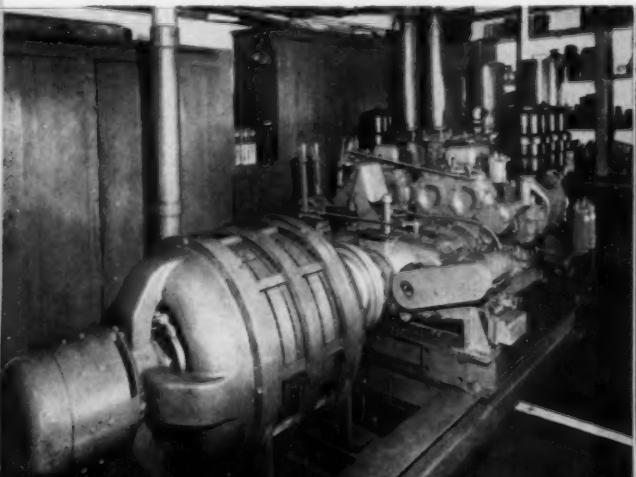
The advantages cited for diesel engines in emergency standby applications are much the same as those they offer to other users. In the first place, they have a long established reputation for eco-

nomical, dependable performance. They utilize the heat of compression to burn low cost diesel fuel and consequently do not need spark plugs or ignition systems. Because of this they are relatively unaffected by dampness which may be encountered in basement locations and there are fewer parts to get out of order, service and replace. They reduce the danger of fire because they burn non-volatile fuel. This is important since most of these power units are in the buildings they serve.

Like other types of engines these diesels start at the push of a button. They may also be equipped with automatic starting devices which "take over" on a specified drop in voltage or water pressure. They fit into smaller space, need no elaborate bases and are compact enough for easy installation in basements or other out-of-the-way locations. Usually no extensive changes to the average industrial or public buildings are needed for the installation. They need little attention other than normal preventive maintenance and periodic runs to assure constant availability.

This "Twin Six" General Motors diesel engine installed in a state penitentiary drives a 220 volt alternating current standby generator. In an emergency it instantly can pick up enough of the power load to operate refrigerators, lights and keep basic prison activities moving.

Three 2-cycle diesel standby pumping engines in a municipal water department weigh less than the flywheel of the old steam plant they replaced. Each unit is 5 feet high, 2 feet 8 inches wide and 15 feet long. In case of emergency the pumps can be connected to the diesel engines and be pumping again under full load within two minutes.



# CARTHAGE, MISSOURI

## Saving Over \$90,000.00 A Year With Duafuel Engines—Efficient and Economical Operation Results in Low Electric Rates

By H. J. WILLIAMS\*

**T**WO large diesel engines operating on low pressure natural gas have been in successful operation at the Carthage, Missouri municipal electric plant since April and June 1950, and have reduced fuel costs to less than 2.4 mills per kilowatt-hour. These big two-cycle Nordberg engines can be switched instantly from fuel oil to natural gas or from natural gas to oil, an important advance for the builders of two-cycle engines in the high horsepower range. The first unit to be converted was a 3,600 hp., two-cycle, solid injection Nordberg diesel of nine cylinders, 21½-inch bore at 225 rpm. This unit ran from April 1, 1949 to February 26, 1950 as a full diesel. Shut down on February 26 for conversion, the engine was back on the line as a duafuel unit on April 7, 1950.

\*General Superintendent, Carthage Water & Electric Plant.

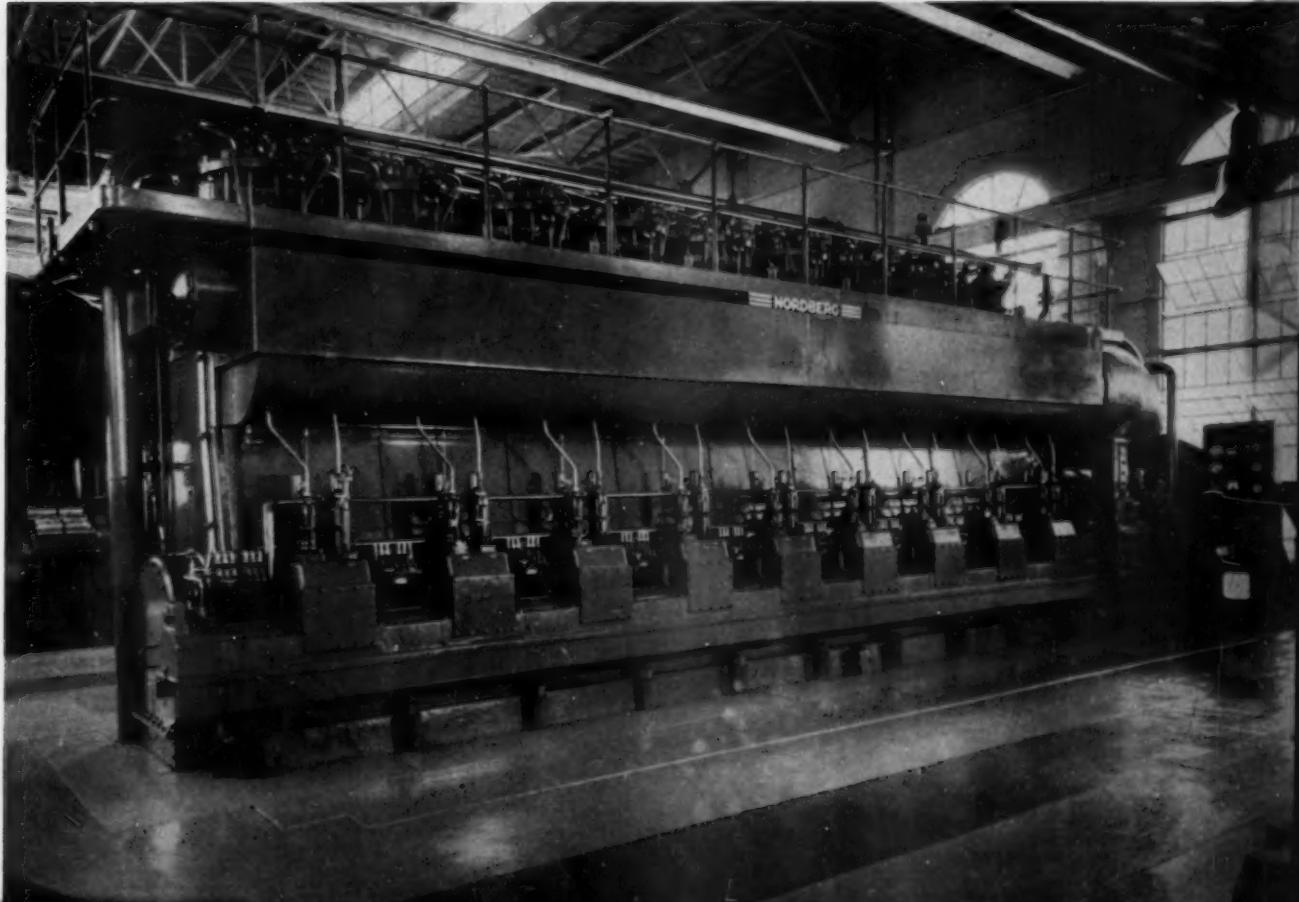
The next conversion job was done on a 3,200 hp., eight cylinder Nordberg engine of the same speed and cylinder size. This engine had been in service as a full diesel since April 26, 1946. It was shut down on May 5, 1950 and put back into service as a duafuel unit on June 8, 1950. The plant management has compiled figures on the performance of these engines for the five-month period from July through November, 1950 and for the corresponding period of 1949 in order to show concretely the effects of the conversion on plant operations, the efficiency of the gas-burning units, and the exact dollar savings achieved. The 3,600 hp. engine (designated as No. 7 in the plant records) generated 5,536,300 kwh. in the five months as a duafuel. In that period, the unit consumed 59,945,326 cu. ft. of gas and 34,400 gal. of pilot oil. Figuring gas as 1,000 btu. per cu. ft. and oil as 144,000 btu. per gal., the btu. consumption per kwh. was

10,828 of gas and 893 of oil, a total of 11,721 btu. During this period, the engine ran 2,920 hours at an average load of 1,896 kw., with peak loads of 2,300 kw. and higher. Consumption of cylinder lubricating oil totaled 1,445 gal. No oil was added to the crankcase supply. This consumption represented an excellent 7,274 hp. hr. per gal. of lubricating oil.

The 3,200 hp. engine (No. 6) generated 3,899,000 kwh. in the five-month period. This unit is served by a motor-driven scavenging air blower and the current consumed by the blower has been subtracted from gross generation to obtain the net figure cited. The engine used 41,155,674 cu. ft. of gas and 30,169 gal. of pilot oil, an average of 10,555 cu. ft. of gas and .0077 gal. of oil per kwh. This meant 10,555 btu of gas and 1,108 btu of oil for a total of 11,663 btu per kwh. The engine ran

This 3600 hp. Nordberg engine went on duafuel operation in April 1950. It can be switched instantly from gas to oil or oil to gas. The American Bosch fuel pumps inject pilot oil while the actuator pumps regulate the lift of the gas admission valves.

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CARTHAGE, MISSOURI MUNICIPAL POWER PLANT—Table I

1960	KWH GENERATED			FUEL OIL CONSUMED		CONSUMED MCF GAS		CU.FT. GAS PER KWH	OPERATED ENGINE HOURS	LUBE OIL, GAL.	
	*3200- hp.	3600- hp.	Total Plant	3200- hp.	3600- hp.	3200- hp.	3600- hp.			3200- hp.	3600- hp.
July	742,500	1,219,000	2,080,500	5082	7199	7946	13,748	10.70	11.27	479	655
Aug.	844,000	1,218,100	2,213,000	5724	6912	9075	15,537	10.75	11.11	519	639
Sept.	584,700	816,300	1,446,000	4217	4963	6251.5	8,776.5	10.65	10.75	367	458
Oct.	817,000	1,091,800	1,992,800	5920	6740	8701.5	11,598.5	10.65	10.62	509	585
Nov.	910,800	1,191,100	2,215,000	9226	8596	9201.6	12,285.3	10.10	10.31	549	603
Total	3,899,000	5,536,300	9,950,500	30,169	34,400	41,155.6	59,945.3	10.55	10.85	2,414	2,920
										1,210	1,445

1949		KWH. Per Gal. Fuel	
July	360,700	1,294,600	2,068,000
Aug.	225,900	1,263,400	2,072,500
Sept.	606,100	718,200	1,865,300
Oct.	596,400	731,900	1,969,800
Nov.	717,100	569,300	1,846,600
Total	2,506,200	4,377,400	9,822,200
			187,777 334,554

\*These are net figures with power consumed by the motor-driven blower subtracted from gross generation.

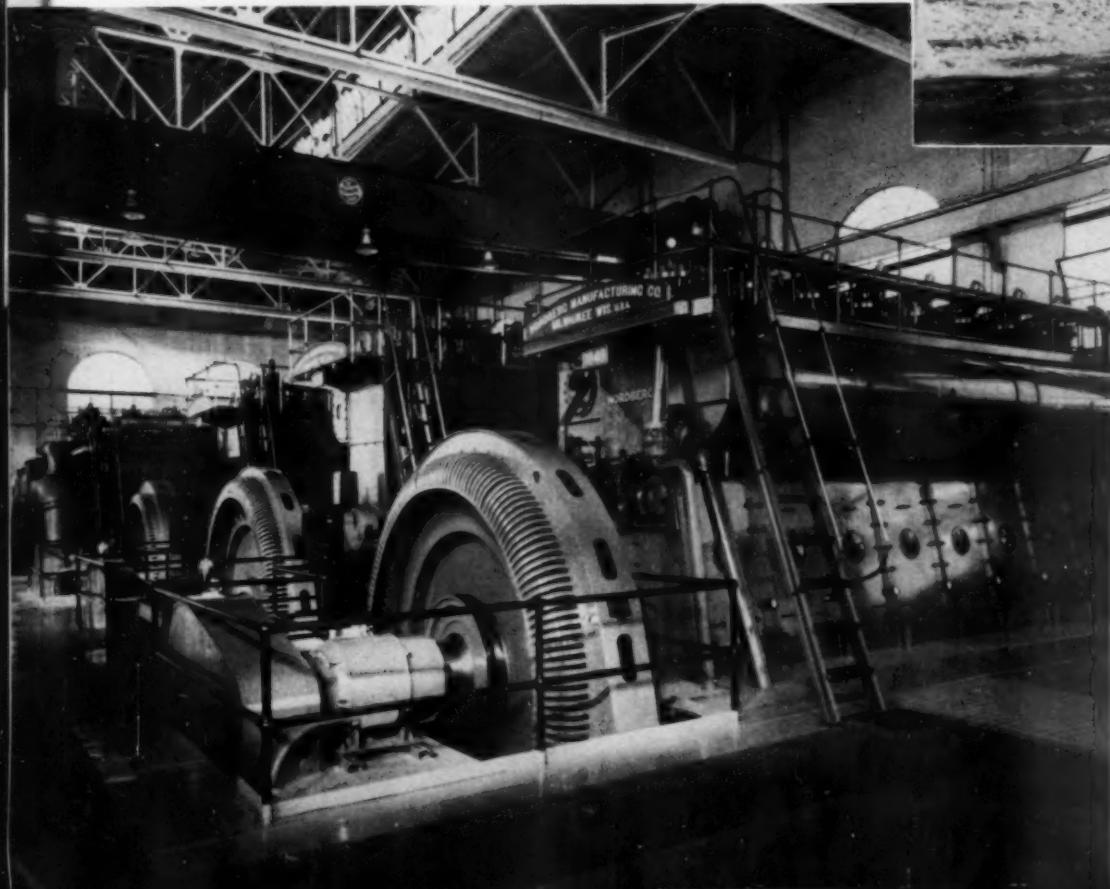
2,413 hours at an average net load of 1,615 kw. Cylinder oil consumption was 1,074 gal. and 76 gal. of lubricating oil were added to the crankcase, a total of 1 gal. of lubricating oil for each 6,714 hp. hr. of operation.

Translating fuel consumption into dollars, the cost of natural gas for the No. 7 engine was \$9,591.00. Pilot oil for the five months cost \$2,924.00. Total fuel cost was \$12,515.00 for an average of \$.00226 per kwh. Cost of gas for the No. 6 engine was \$6,584.00, cost of pilot oil, \$2,365.00, a total fuel cost of \$9,149.00 for an average of \$.00234 per kwh. This production economy was

achieved with gas averaging \$.16 per mcf and oil at \$.085 per gallon. The corresponding five months in 1949 provide an excellent basis for comparison and appraisal of dualfuel operation. All units functioned as full diesels. The No. 7 engine produced 4,577,400 kwh while consuming 334,554 gal. of fuel oil, an average of 13.7 kwh. per gal. The No. 6 engine generated 2,506,200 kwh. (again a net figure after subtraction of blower consumption) on a total of 187,777 gal. of fuel oil, an average of 13.3 kwh. per gal.

With comparable fuel efficiency, the No. 7 engine would have required 404,109 gal. of fuel oil to

There are five Nordberg engines in the Carthage plant totaling 12,550 hp. At right is the 3200 hp. unit which was converted to gas in June 1960.

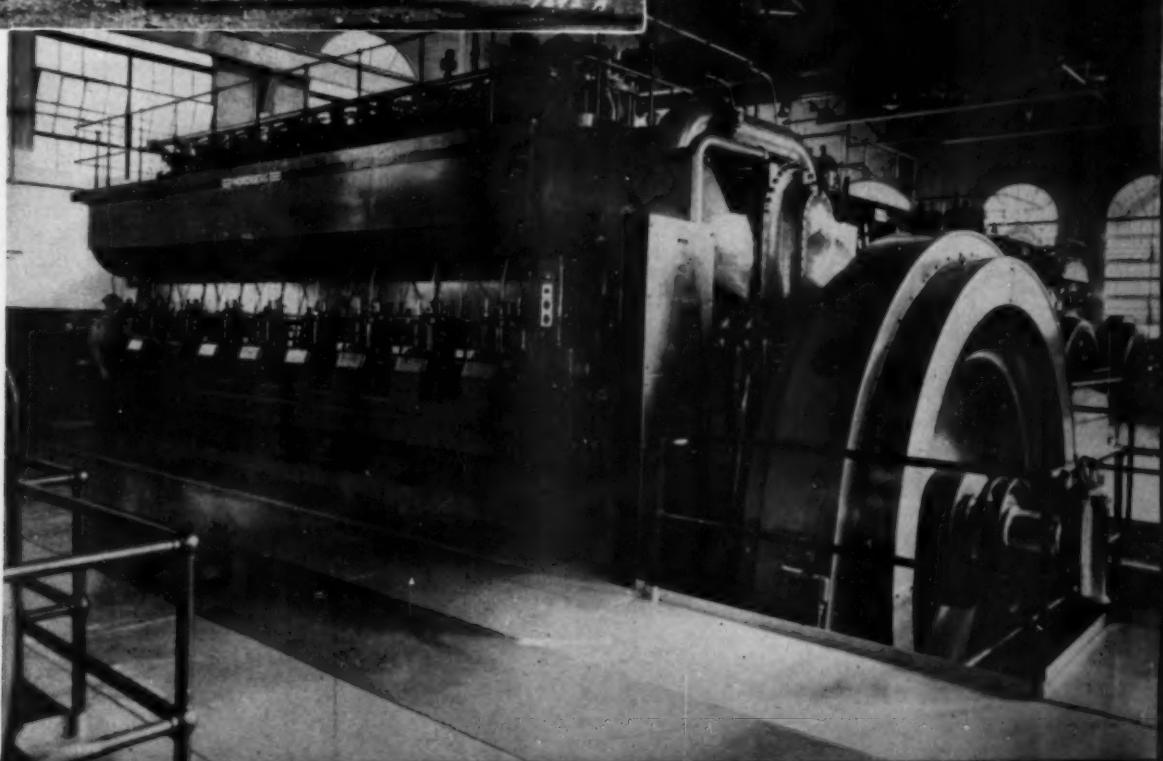




produce the 5,536,300 kwh, generated in the five months of 1950. At the prevailing fuel cost of \$.085 a gal., this would have meant a fuel cost of \$34,349.27 or an average of \$.0062 per kwh. Actual cost of natural gas and pilot oil was just \$12,515.00, leaving a net savings of \$21,834.27. The savings per kwh. was \$.00394. To produce its 3,899,000 kwh. the No. 6 engine would have required 293,158 gal. of fuel oil at a cost of \$21,918.43, an average of \$.00639 a kwh. Actual cost of gas and pilot oil was only \$9,149.00, leaving a net saving of \$15,769.43. The saving per kwh. was \$.00405.

Total savings on fuel for just five months of dual-fuel operation were an impressive \$37,603.70. At this rate the savings amount to \$90,248.88 per year. Table I gives a month-by-month operating picture for both the 1949 and 1950 period cited. It is evident that the economical gas-burning engines are operating more hours and producing a larger share of the plant's total generation. The big units were the mainstay of the plant in the 1949 period, handling 72 per cent of the total plant output, but in the five months of 1950, the two engines generated fully 90 per cent of the plant production. Although this results in the best over-all plant economy, the preferential use of the big engines inevitably results in occasional operation at less than optimum load factors so that the average fuel consumption does not reflect the peak efficiency of the units. As the plant load increases the efficiency also increases.

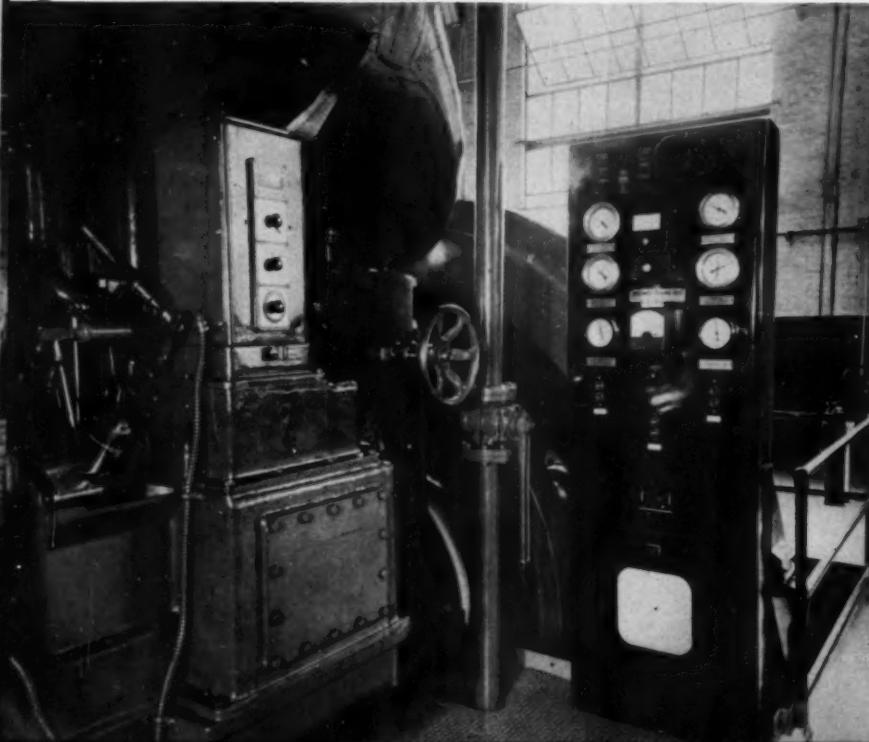
In five months this 3600 hp. Nordberg saved \$21,834.27 in fuel costs. The 3200 hp. unit saved \$15,769.43 in the same period for a total dualfuel saving of \$37,603.70.



The natural gas is supplied by the Gas Service Co., a subsidiary of the Cities Service Gas Co., and is delivered from the gas company's master meter at 24 lbs. pressure. Rust and scale are removed in a gas cleaner and the gas is then regulated to 17 lbs. pressure and passed through a positive displacement rotary meter for each engine. Reaching the engine at 17 lbs., the gas goes through an admission valve to a header and then through regulated throttle valves to each cylinder. Gas enters the cylinder through an actuator valve controlled by an actuator pump which hydraulically effects the lift of the valve. The pump, in turn, is controlled by the governor to meet varying load conditions. For duafuel operation, a constant-volume small charge of pilot oil is injected to facilitate and stabilize ignition of the gas. This pilot oil is handled by the regular fuel injection pumps and nozzles which serve the engine in full diesel operation. The pumps are specially calibrated to meter accurately the small quantities of oil. The plant uses the same fuel oil for diesel and duafuel, a 26.9 api gravity oil. The engines have full safety devices and shut down automatically if fuel oil or lube oil pressures drop below prescribed limits. There is also an automatic overspeed shutdown. It is necessary only to move a lever to switch the engine from full diesel to duafuel operation or back to diesel. The units are commonly started on fuel oil and then switched over to gas.

In a duafuel engine, fuel economy is the big story but not the whole story. The plant is showing a sizeable saving in the cost of cleaning crankcase lubricants. It has been found that purifier refills last three times as long for the duafuel engines as they did for the same engines burning fuel oil.

The movement of the control lever switches the 3600 hp. Nordberg diesel from duafuel to full diesel or from diesel to gas. Also shown is the Woodward governor and the Nordberg gauge panel with Alnor pyrometers, Viking alarms and Lonergan gauges.



### Principal Equipment Serving Duafuel Engines

Duafuel Engines: One 3600 hp., nine cylinder,  $21\frac{1}{2} \times 29$ , 225 rpm, two-cycle, solid injection, Model TS219. Nordberg.

One 3200 hp., eight cylinder, Model TS218 of same speed and cylinder size. Nordberg.

Generators: One 2500 kw., 3750 kva., 2400 volt generator with 30 kw. V-belted excited. General Electric.

One 2250 kw. 3125 kva., 2400 volt generator with 40 kw. V-belted exciter. Allis-Chalmers.

Governors: Woodward Governor Co.

Gas Meters: Roots Connersville Blower Corp.

Fuel Oil Purifier: Honan-Crane Corp.

Fuel Heat Exchanger: Struthers-Wells.

Fuel Pumps: Blackmer.

Fuel Filters: Wm. W. Nugent Co.; Cuno Engineering Co.

Fuel Injection Pumps: American Bosch.

Actuator Pumps: American Bosch.

Lube Oil: Socony Vacuum.

Lube Purifiers: Honan-Crane Corp.

Lube Refiners: Youngstown Miller.

Cylinder Lubricators: Manzel Bros. Inc.

Auxiliary Lube Pump: Blackmer.

Oil Coolers: Struthers-Wells.

Scavenging Blowers: Roots-Connersville on 3600 hp.; Allis-Chalmers on 3200 hp.

Air Filters: American Air Filters on 3600 hp.; Dolinger on 3200 hp.

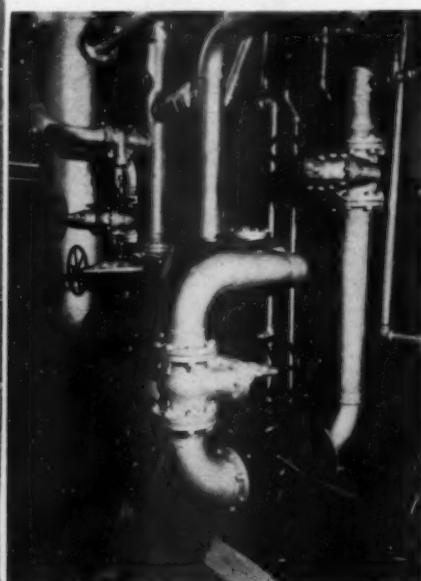
Intake Silencers: Burgess Manning Corp.

Exhaust Snubbers: Burgess-Manning Corp.

Cooling Tower: Marley.

Exhaust Pyrometers: Alnor. Illinois Testing Labs.

The big Nordberg is served by a Blackmer auxiliary lube oil pump and a Struthers Wells oil cooler.



THE 20 acre, scrap steel yard of Berg Metals Company located in central Los Angeles, handles more scrap metal than any other similar yard west of the Mississippi. Ten hours a day, six days a week, countless numbers of trucks bring in loads of scrap metal in every imaginable form: from bits of sheet steel to auto bodies, engine blocks, old structural steel, and obsolete locomotives. After weighing in, each truck is directed to an unloading point close to one of the parallel tracks that runs from one side of the yard to the other. On each of these tracks there is a Brown Hoist Co. locomotive crane with a Cutler Hammer magnet. Cranes are Models 4 and 5.

Trucks are quickly and continuously unloaded, with the magnets dropping down to pick up large clinging loads which are swung around to be dropped on the proper piles. The same units are used to load out the scrap in railway gondolas, and in trucks. These units have been converted from steam to diesel along with another one in use in the company's smaller yard, (about ten miles farther south on Alameda St.). Another, similar, used Brown hoist locomotive crane will soon be converted in the same manner.

The cranes were originally powered with 50-hp. vertical, tubular steam boilers. Recently converted to diesel, each has had a Model 518 "Caterpillar" diesel installed complete with appurtenances, by Shepherd Tractor & Equipment Co., of Los Angeles. The diesels are set for maximum power, 105 hp. at 1800 rpm. According to B. W. Olney, Scrap Steel Yard Superintendent, "the crane movements and hoisting operations are far more efficient and much easier on the operator with the diesel. He doesn't have to worry about keeping up the steam pressure. We only have to refill the 60 gal. diesel fuel tank on each crane every third day of operation. With the intermittent hoist operation only, at full power output, the diesel fuel consumption is very low, while with the steam engine, fuel consumption ran to a much higher figure due to the necessity of keeping up the full steam pressure. To illustrate the large saving in fuel costs, a full operation over eight hours with one of the cranes, used up 15 gallons of diesel fuel. During the same working period, while doing less work, the crane formerly used about 150 gallons of fuel oil to produce steam. In continuous car loading, one of the dieselized cranes could handle up to 500 tons of scrap steel and iron per ten hour day."

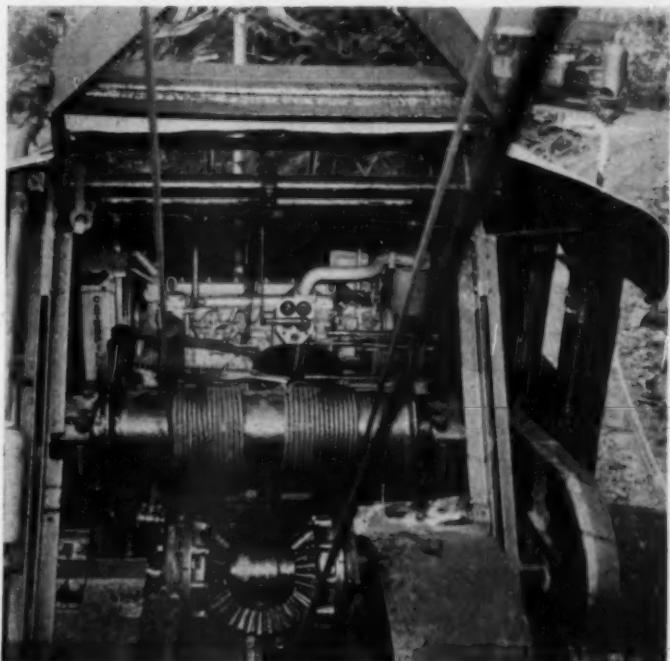
Installed with each diesel was a Twin Disc torque converter. Also an 8-cfm Gardner-Denver air compressor with a special front power take-off. Using this live shaft, a continuous air supply for braking is assured. The diesel throttle control was hooked to the old steam throttle to retain the same general working condition, familiar to the operators. As the steam engine could be reversed and the diesel cannot, a second (friction) clutch and bevel gear on the countershaft, was installed for reverse motion to move the crane on the track. The boom hoist, similarly, has two jaw clutches and bevel gears for two-way operation.

The conversions and rebuilding were engineered by B. W. Olney (yard superintendent) with some help from Shepherd Tractor Co.

## Diesels Handle Scrap Steel

### Locomotive Cranes Converted From Steam to Diesels for Large Fuel Savings

By FRED M. BURT



## DIESEL SHIP "FORT JACKSON"

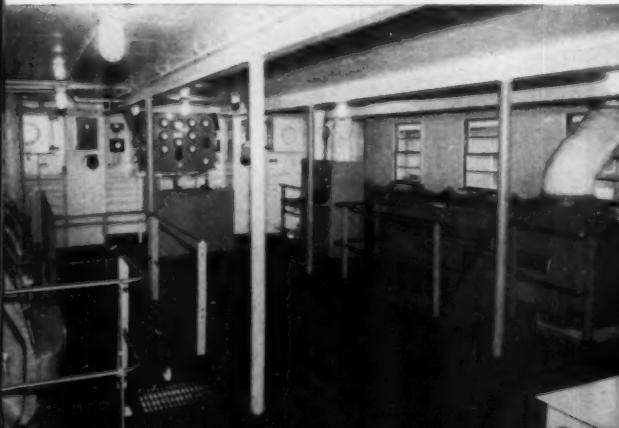
THE John I. Hay Co. of Chicago, Illinois, on Monday, March 19, 1951, at Havana, Illinois, accepted delivery of their newest and most powerful towboat, the *Fort Jackson*. Embodying the latest features in modern design the *Fort Jackson* represents the years of experience of the John I. Hay Co. as operators, and the St. Louis Shipbuilding & Steel Co. as designers and builders of river towing equipment. Powered with a pair of Fairbanks-Morse opposed-piston diesels equipped with Kort reverse-reduction gears, and fitted with Kort nozzles and contraguide rudders, the *Fort Jackson* is expected to be the most powerful towboat of its horsepower on the rivers today.

In appearance the *Fort Jackson* is almost identical to the *Fort Dearborn* which was built in 1949 for the Hay Co. by St. Louis Ship. However, the hull and draft of the *Fort Jackson* are deeper and it has much larger propellers. The hull is 156 feet long, 35 feet beam and 11'-0" deep with a normal draft of 8'-0" and a draft fully loaded of 8'-6". When fully fueled the *Fort Jackson* carries 321 tons of fuel or 21 days supply under full load. The wash water tanks and drinking water tanks also carry a 21 days supply of water.

Built to the highest American Bureau of Shipping classification, the *Fort Jackson* is of all-welded steel construction with an exceedingly heavy hull. Bottom and side plating is  $\frac{3}{8}$ ", bilge stakes and tunnel plates are  $\frac{1}{2}$ ". Deck plating is  $\frac{5}{16}$ " and  $\frac{7}{16}$ ". Framing is both longitudinal and transverse with  $\frac{3}{8}$ " plate bulkheads stiffened vertically and horizontally. With a series of longitudinal and transverse bulkheads, the hull is divided into 22 watertight or oil-tight compartments. The bow is of the St. Louis Ship model-scow type with particular attention being given to obtaining easy flowing waterlines. The tunnels are well-rounded and fair into the big Kort nozzles which are built to accommodate the 102" diameter propellers. These Kort nozzles are among the largest ever built for a river towboat, and are an indication of the tremendous push-power this towboat will have. Equipped with Kort nozzles and Contraguide rudders, the *Fort Jackson* will have at least 30 percent more power than towboats of the same horsepower not so equipped.

Looking forward on main deck in engine room showing top of the two Fairbanks-Morse diesels, gauge board and central control stand.

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With the main engines and auxiliaries located well to the stern, all living quarters, mess, galley, and lounges are forward of the engine-room where they are isolated from engine noises. On the main deck, quarters are provided for 4 cooks and 14 crew members with separate bathrooms for the cooks and crew. Also on the main deck is a large galley, crew's mess, officers' mess, and the crew's lounge. Inside stairs and passageways provide access to all quarters and to the pilothouse. On the upper deck is located the officers' lounge, Captain's quarters, and quarters for 2 guests, the chief engineer, a pilot, and two assistant engineers. There are two bathrooms on this deck.

The deckhouse and pilothouse are of steel, lined with  $\frac{1}{4}$ " tempered Masonite, and all exposed walls and ceilings are insulated with 2" of Fibreglas. Inside partitions are of Masonite, except the engine-room bulkheads are of steel with the bulkhead between the engineroom and quarters insulated and lined. All exterior doors are of steel, interior doors of wood; all sash except forward pilot house sash are of Truscon steel sash. All doors and windows are screened. Armstrong greaseproof asphalt tile covers the floors in all living quarters. Twelve inch electric fans are provided in all quarters and an exhaust fan for the galley. The galley and messrooms are extremely large and well arranged for service. Storage space is provided by a built-in pantry and cupboards. A South Bend oil-burning range serves for cooking, and a two compartment walk-in type refrigerator provides a refrigerated space and also for frozen foods. To insure the satisfactory operation at all times, duplicate refrigeration compressors and motors are connected to the coils, either compressor being of adequate size to maintain the temperature desired. A 7 cubic foot reach-in refrigerator is installed in the crew's mess and is used as a "night-box" to keep food for the crew for that "midnight snack."

The large engine room permits the arrangement of all machinery so as to be readily accessible for efficient care and maintenance. Two General Motors 60 kw. d.c. diesel generators and one 20 kw. General Motors diesel generator are located on the main deck, and supply the electric power for the boat. The main switchboard, work-

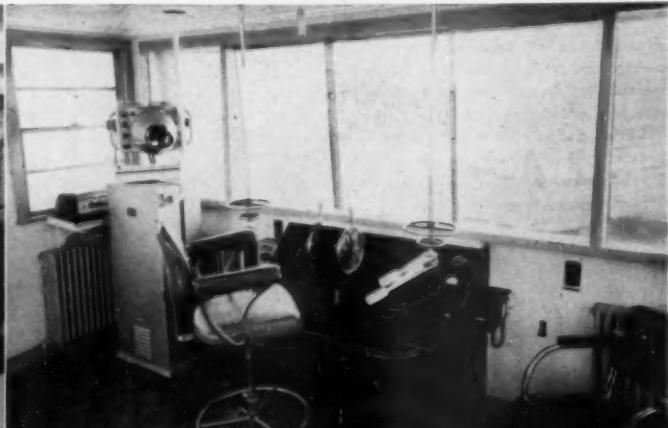
bench, gauge board and engine control stand are located in the engine-room on the main deck. The ceiling and side walls of the upper engine room are soundproofed with Johns-Manville acoustic Transite and J-M acoustic blanket.

The motor driven Gardner-Denver air compressors, air tanks, potable and wash water sets, Worthington fire pump and fuel oil transfer pumps are all located in the hull compartment forward of the engine-room. The motor driven circulating water pumps, the lube oil coolers, Honan-Crane lube oil purifiers, and the lube oil transfer pump, are all located in the lower engine room. Cooling of the main engines and auxiliaries is accomplished by a St. Louis Ship skin cooling system controlled automatically.

Following the practice of the John I. Hay Co. on their other boats, the main engines and gears will not be pilothouse controlled but will be controlled from a stand in the engine room. A mechanical telegraph system will be installed from the pilothouse to the engineer's stand on the main deck in the engine room. The boat is equipped with 4 backing rudders (2 forward of each propeller) and 2 Contraguide steering rudders. The steering and backing rudders are controlled separately by a St. Louis Ship electro-hydraulic system with follow-up controls. The steering gear, including controls and cylinders is located in the main deckhouse aft of the engine room.

Filtered air for the main engine blowers is taken from separate air intakes on the Texas deck. The engine room and hull compartments are ventilated by motor driven blowers located on the Texas deck with ducts leading to the various compartments. The extremely roomy pilot house can be reached by inside or outside stairs. The forward sash are of special St. Louis Ship design, affording the maximum of unobstructed vision. This, plus the large windows on the other three sides, assures the pilot of adequate vision in any direction. The console was manufactured by St. Louis Ship and contains all the necessary instruments and switches for the proper handling of the boat. An R. C. A. radar completes the pilot house arrangement.

Pilot stand on the diesel ship *Fort Jackson* showing the R.C.A. radiomarine radar and general comfort and convenient layout of this important operating headquarters.



Left to right: Mrs. John Seemann, John Seemann, Mrs. H. T. Pott, H. T. Pott, Mrs. John O. Innes, John O. Innes, Mrs. Frank R. Markland, John I. Hay, Frank R. Markland.



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## DIESELS TAKE TO THE WOODS

By W. J. GRANBERG

**P**aul Bunyan and Babe, his blue ox, had nothing over today's logging equipment when it comes to power what with diesel engines taking to the woods to serve yarders, skidders, loaders and haulers in "shows" that demand economy and efficiency of operation. Heavy, cumbersome equipment that once crashed through virgin-growth timber in a "cut-and-get-out" policy that saw countless trees damaged and wasted is a thing of the past. Modern cutting in second-growth forests, including pre-logging and logging for salvage and pulp wood, calls for compact, economical and fast working machines.

To attain the desired speed and economy of operation, much of the equipment now in the woods is being repowered, to say nothing of the fact virtually all new logging machinery is being powered with the most modern diesel engines available. Typical of these repowering jobs is the one done recently for the Kosmos Timber Co., a subsidiary of United States Plywood Corporation, which is logging near Morton, Wash. This firm was working a Skagit Iron and Steel Works yarder that was powered with a 150 hp. gasoline engine. The yarder had four speeds, two on the drums and two on the clutch shaft, and it was the clutch that gave the trouble. With work supervised by the Evans Engine & Equipment Co., Seattle, the first step was to remove the clutch shaft and the second was to install a Model 62400 110 Detroit General Motors diesel engine. This 6-cylinder power plant, with a bore and stroke of 5 x 5.6, has a total

displacement of 660 cu. in. It has a maximum rated brake horsepower of 250 at 1800 rpm.

With the yarder reduced to two speeds on the drums and the troublesome clutch eliminated, the problem was to increase the pulling power and speed, and toward that end a Model TC-905 Allison torque converter was installed. The Evans engine men achieved the greatest efficiency from the 110 diesel and the yarder with a reduction between the torque converter output shaft and the main drum of 57 in low gear and 26.4 in high. The power of the working line under the old gasoline engine had been 30,000 pounds at 75 feet a minute, but this jumped to 57,000 pounds with the new 110 diesel. The stall pull, which had been 30,000 pounds, now stood at 82,000 pounds. As though these gains in working ability were not enough, the yarder's maximum speed in high gear was increased to 680 feet a minute on a 7500 pound pull from 490 feet with the old power plant. In addition to the increased power and speed, which are more than welcome in a modern logging "show", the torque converter drive made for

smoother operation and cable breakage, which had been common under the old clutch drive, was eliminated. With sudden and heavy load changes taken up by quick response of the 110 diesel and the rapid increase in torque, the logs are handled smoothly and quickly, without breakage strains on the cables, or shock to the yarder.

Logs from the Kosmos Timber Co. operation are being hauled out under contract by Lloyd E. Larson, of Morton. Among his 10-wheeled tractors which draw eight-wheeled log trailers are new Internationals powered with HB-6 Cummins diesel engines. Dan Soderlund is superintendent on the job for Kosmos. Up in the opposite corner of Washington, near Neah Bay and the ocean on the Olympic Peninsula, Crown Zellerbach Corporation

This close-up view of the Skagit yarder that was converted from gasoline to diesel shows the new 110 Detroit General Motors engine. At center on the engine is the huge Donaldson air cleaner, while to the lower left of it is the torque converter and above that, the blower.



is taking out hemlock in a pulp wood operation that calls for speed in handling comparatively light timber. This entire operation, from skidder to loaders and haulers, is powered by diesel equipment. This, too, was a repowering job, one that called for improving the speed and pull of the Berger skidder in order that the hemlock might be handled economically. The Evans firm handled the work, installing a Series 70 Model 12107 twin-six General Motors diesel engine. The rated brake horsepower of this unit, which has a total displacement of 851.2 cu. in. and a bore and stroke of  $4\frac{1}{4} \times 5$ , is 400 at 2000 rpm. The gear ratio with the old unit was 39.5 in low and 13.5 in high. Operating at four speeds, the skidder's line pull and speeds were increased approximately 30%. From the torque converter shaft the gear reduc-

tions now are: low, 36 to 1; low intermediate, 24.5; high intermediate, 15.7; and high, 12. The stall pull of the skidder now is 90,000 pounds. The maximum pull in low had been 35,000 pounds at 120 feet a minute, but the new engine has boosted this to 55,000 pounds at 120 feet. The maximum speed, which once stood at 650 feet a minute on 10,000 pounds, now is 950 feet. Although the amount of timber skidded for loading each day is not altogether indicative of the skidder's capacity, for these hemlock logs are comparatively small when compared with Douglas fir, a minimum of 100,000 feet normally is handled. This is hauled in 12 or 13 loads, trailers drawn by tractors powered with HB-6 Cummins diesel engines.

The method of loading these logs is a somewhat novel one, a fast and economical one that is especially adapted for use in handling small timber in pulp wood, salvage, and pre-logging operation. It has, in fact, made many logging operations feasible which would not have been practical with the older and more conventional methods. Loading is done by an air-tong that was invented by a logging superintendent of Crown Zellerbach. It may be fitted to virtually any power shovel, which means loading can be done by a flexible machine that can swing in any direction and place the logs accurately on a trailer. The safety factor of this method is an important element, for the loading job is entirely mechanical, handled by the shovel operator without outside manual labor.

The air tong consists of two curved legs pinioned to a rigid frame. An air cylinder is secured to one leg above the pin-points and the piston to the other. When air is applied, the tong legs encircle a log and as it is picked up the butt of the log heels against a sawtooth plate fitted to the dipper-stick of the shovel, or in the case of large logs, against the shovel boom. With boom extended or retracted and swinging in either direction, the shovel lifts the log and places it on the trailer. Operation of the air tong is under 250 pounds pressure from a Quincy compressor. The device, known as the Berger-Reese loader, may be fitted to existing dipper-sticks, or acquired with new dipper-stick or boom, for fitting as a complete unit to power shovels ranging from  $\frac{1}{2}$  yard to  $1\frac{3}{4}$  yard capacity. Logs from 30 inches to 56 inches in diameter are handled by the air-tong which is manufactured in three sizes.

In the Crown Zellerbach "show" at Neah Bay, loading is done by two 43-B Bucyrus-Erie power shovels using this new air-tong. They are powered with Cummins diesel engines. The loading device is being fitted to scores of dieselized shovels in the Pacific Northwest, including Lima and P & H in addition to Bucyrus-Erie, and is in use by such companies as Weyerhaeuser Timber Co., Simpson Logging Co., as well as Crown Zellerbach. As a result, diesel shovels are going logging, a new chore for them, along with the yarders, skidders and tractors.

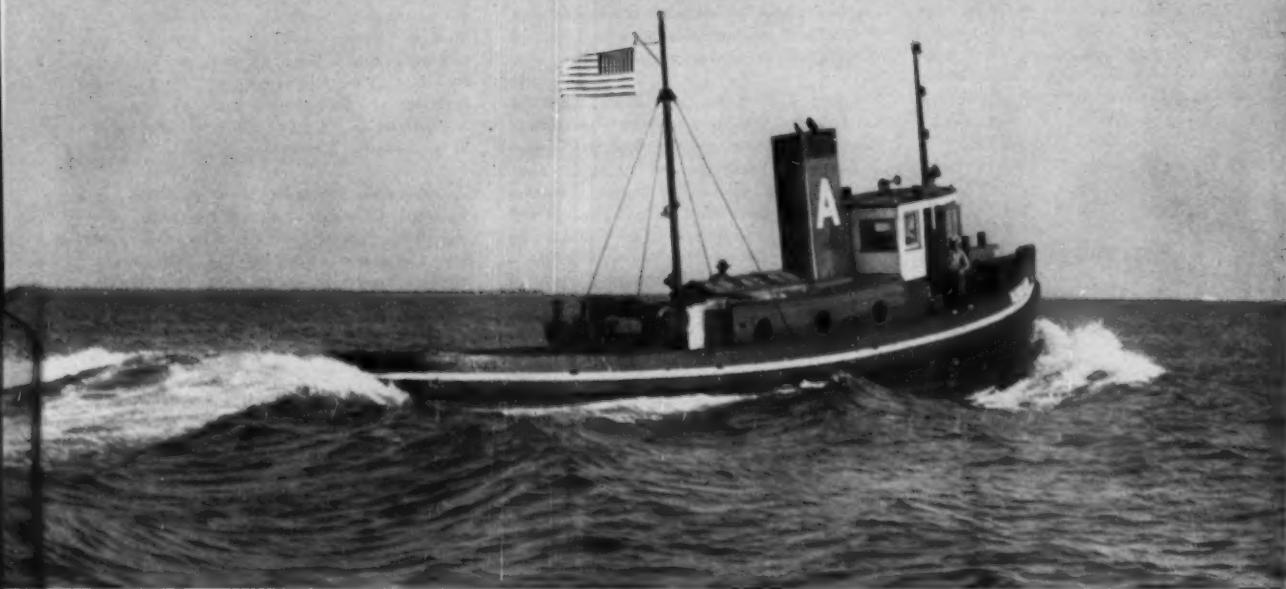
Logs not only are yarded and loaded by diesels but hauled to the mills by diesel tractor-trailers. This 18-wheel rig includes an International truck powered with a six-cylinder Cummins diesel. It is hauling from the Koniakos Timber Co. "show" near Morton, Wash.



Three uses of diesel power are shown here in this Crown Zellerbach Corp. logging operation near Neah Bay, Wash., where skidder, new type loader, and truck are at work. The Cummins-powered shovel is using a new air-tong for economical loading of small logs.

## "ALASKA QUEEN" REPOWERED

By:- Sidney Hoffman



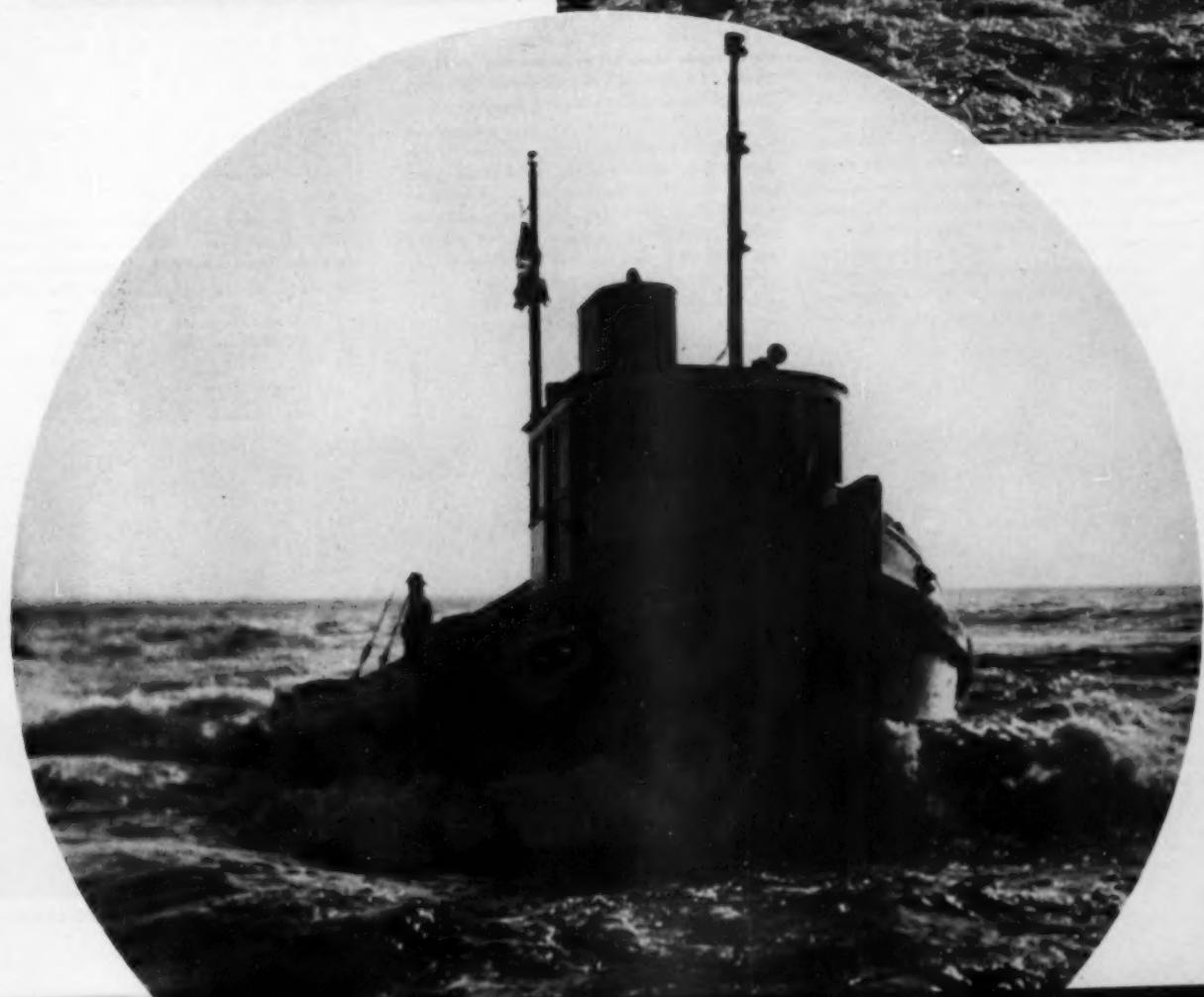
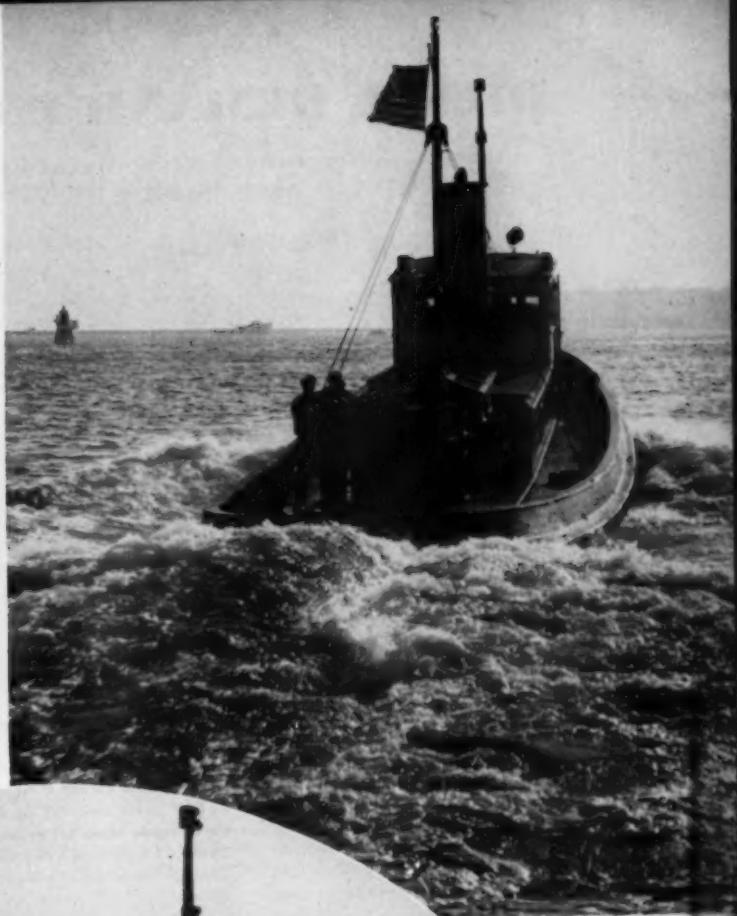
**I**F THE approval of a boat's crew is any indication, The National Supply Company last month completed a new and highly successful engine installation at their Terminal Island, California, yards. With a supercargo of highly critical passengers aboard, the re-engined tug, *Alaska Queen*, cast off her lines from the company's docks a few weeks ago and proceeded to prove herself in a trial run. A comparatively small craft, 70 feet in length with a beam of 18 feet and drawing 8 feet of water, the *Alaska Queen* is powered by the first Lister-Blackstone diesel installation of its size on the west coast. Originally launched in 1945 and operated by the Alaska Tug and Barge Company of Long Beach, California, the boat has been doing general tug work along the coast and pulling tugs from San Diego to San Francisco.

Several months ago the owners decided to increase the craft's power by installing a new engine. They did a complete job of it. Practically everything in the engine room is new. The main power plant is an 8-cylinder Blackstone diesel having a stroke of 11½-inches and a bore of 8½-inches, developing 960 horsepower at 600 rpm. and driving a four bladed propeller through a 2:1 hydraulic reduction gear. The auxiliary engine is a 2-cylinder Lister developing 16 horsepower at 1200 rpm. The other new equipment includes a Quincy compressor, a

Fairbanks-Morse generator, a Pacific pump, a Worthington steam pump and a Gould fire pump. The propeller, supplied by the Pitchometer Propeller Company of Alameda, California, is a 61-inch by 51-inch giant. Its four blades have a surface area of 2,030 square inches. A considerable amount of doubt had been expressed by several people as to the Blackstone engine's ability to handle a screw of that size. Consequently, it was with a great deal of interest that the observers watched the behavior of the craft and its English power plant.

Aboard for the trial run was the commercial representative of the British Consulate General, Mr. S. V. Hardy; Mr. H. J. Keizer, west coast sales engineer for Lister-Blackstone; representatives of the National Supply Company who handled the installation; and your reporter among other interested parties. As the tug pulled away from the dock, the observers very consciously waited for any excessive vibration and noise caused by the large propeller. Once outside the breakwater, the engine was opened up to 600 rpm. and this tough little work boat fairly dug her stern into the water and leaped forward. At no time during the entire run of several hours did it develop any excessive vibration. Rather, it performed with unusual smoothness. Making three passes over a measured nautical

mile, the *Alaska Queen* averaged a little under 10 knots. Her maneuverability and responsiveness to the controls made the co-skippers fairly bubble with enthusiasm for their re-engined craft. The entire run was distinguished by the lack of unexpected occurrences. The performance of the vessel lived up to expectations of the engine builder. She responded to the slightest rudder, stopped and backed within a short distance, picked up speed rapidly, all without any vibration or "shudder." On the speed test she held to a straight course. The young co-skippers, brothers Robert L. and Harry W. Schildwachter stated, "We are 100 percent satisfied with the engine's performance. The power, the maneuverability, and the small amount of vibration is everything a tug man can ask for. This Lister-Blackstone installation has lived up to all our desires and expectations." Back at the dock afterwards, Mr. Keizer, the Lister-Blackstone sales engineer, expressed his satisfaction with the results of the trial run. He added that the success of the run was due in great measure to Mr. Ray Cootes, shop foreman of National Supply who supervised the installation of the power plant, and Mr. Joe Flynn, manager of the yard. The new installation made all concerned sing its praises, and appropriately too. This reporter was advised that timber from the old San Francisco Opera House had been used in the original construction of the tug.



# DIESEL DEMAND PACES FOOD DRIVE

**Annual Conferences of Agricultural Engineers of College and Equipment Manufacturers Show Stepped-up Efficiency in Machine Buying in West**

By F. HAL HIGGINS

THE WORLD food situation is again putting the demands on more efficient farming to produce more food per worker at a lower cost. War, mushrooming populations throughout the world and the unpenning of walled off hordes of semi-barbarians on the civilized world have combined to suddenly reverse the U.S. food market from over-supply to all-out production. But this time the American farmer is a well heeled capitalist with the best equipment he has ever used to tool his food and fiber production. But he wants more of it and still better and bigger to continue his mastery over weather, soil, pests and markets. In a word, what he wants is more Diesels.

The facts of farmer intentions for 1951 were sharply focused at three annual conferences and conventions of California farmers, agricultural engineers, and farm equipment manufacturers at San Francisco, Davis, and Los Angeles early in 1951. The writer annually attends all of these gatherings as a matter of news gathering and orientation on trends in farm mechanization.

Director A. A. Brock of the California State Department of Agriculture recently surveyed the world food situation and came up with the conclusion that from here on there will be no more food surplus because of the rising demands for food by fast growing populations and the lack of much more unpopulated land capable of producing big food surpluses for export. Says Brock: "It seems foolish to make any definite predictions of what the future holds, but I think it is reasonable to expect that we shall continue our trends, and if we can bring in new acreages and new techniques perhaps it may be a good many years before the

countries now exporting will be required to use their total production to feed their own people unless they permit immigration in large numbers from countries that are now overpopulated. Perhaps a little reflection will give a better idea of what we have done in the past and what we can expect in the future. In the last fifty years we have had 100 per cent increase in our population. I think it is reasonable to assume that we will have a similar increase in the next fifty years, and if we do we will have a population of 300,000,000. On this basis, in 2050 we will have in the neighborhood of 600,000,000 people. And so I think from these figures you can judge what the problem in our country will be. We will not be concerned with feeding India and China, but with importing food to feed our own population."

The surveys of the sugar beet, farm machinery and American Society of Agricultural Engineers annual gatherings in California showed that the farmer has already swept the dealers' floors clean of diesels in the form of tractors as he uses his capital to insure his power needs for the next year or two on an economic basis, but he is ordering ahead for future deliveries as far as the factories can supply more for his future. But also, he is ordering from his specialty builders in his local shops diesel powered machines such as rice combines, potato diggers, hay balers, portable sprinkler irrigation systems, sugar beet harvesters, etc. The sugar beet farmers of California are already so nearly completely dieselized in all operations but planting and cultivation that the new wheel diesels now coming onto the scene from Massey-Harris, Deere, International, Oliver and Shepard will complete the trend is only a question of whether the Gov-

ernment now permits the building of the engines for this step. Case, Minneapolis-Moline, Ford and Ferguson with diesel tractors either on field tests in Arizona or in production abroad make it a competitive matter among the manufacturers to get into production here at the earliest moment. That can mean this year, as the British are anxious for export business and are supplying Ford, Ferguson and Allis-Chalmers with their diesel engines in the British manufacturing areas with plans for Canada and U.S. in the works.

The diesel-minded western U. S. and foreign farmer likes the economies of his diesel tractors so well he is eager to go all the way down to the cultivating size wheel tractors that supplement his crawlers that are already diesel. Further, he has the capital as never before to do it at this time, after a decade of very profitable farming operations through the recent world war and the post war years that has brought him again to a war economy. Here are some of the diesel farm tractor operations seen as the year of 1951 starts and the writer has looked in on California and Arizona operations in the wake of the meetings referred to above: Ernest Blackwelder, head of the little factory at Rio Vista of the same name, gave a talk at the annual University of California Farm Machinery Conference. Standing outside the doors of the Farm Machinery building at Davis with other new machines was the new model 1951 Marbeet harvester as the answer to the small and average beet growers' demands for a beet harvester he could afford to own and operate. It was an International MD (diesel) wheel tractor with the beet harvesting

Allis-Chalmers HDS (GM diesel engine) drilling the 1951 wheat crop last fall. The "Inland Empire" of eastern Washington and western Idaho has a lot of wheat farming that is so steep it takes sure-footed tractors to farm it.



attachments mounted on it for use during the beet harvesting season. The tractor was thus available for year-round work at other jobs after the beets were harvested. It drew a lot of attention and will be bought by both big and little growers to insure the harvest of their beet crops regardless of what the labor picture may be. With the bigger one- and 2-row Marbeet harvesters already doing 90% of the California harvest, this new "baby" will make possible the elimination of the last hand worker in the beet harvest if necessary. The consumer gets his sugar, labor gets better jobs on machines in the beet fields and in the factories, and the farmer gets his crop on a profitable basis in competition with other crops like tomatoes, asparagus, lettuce, carrots, beans, etc.

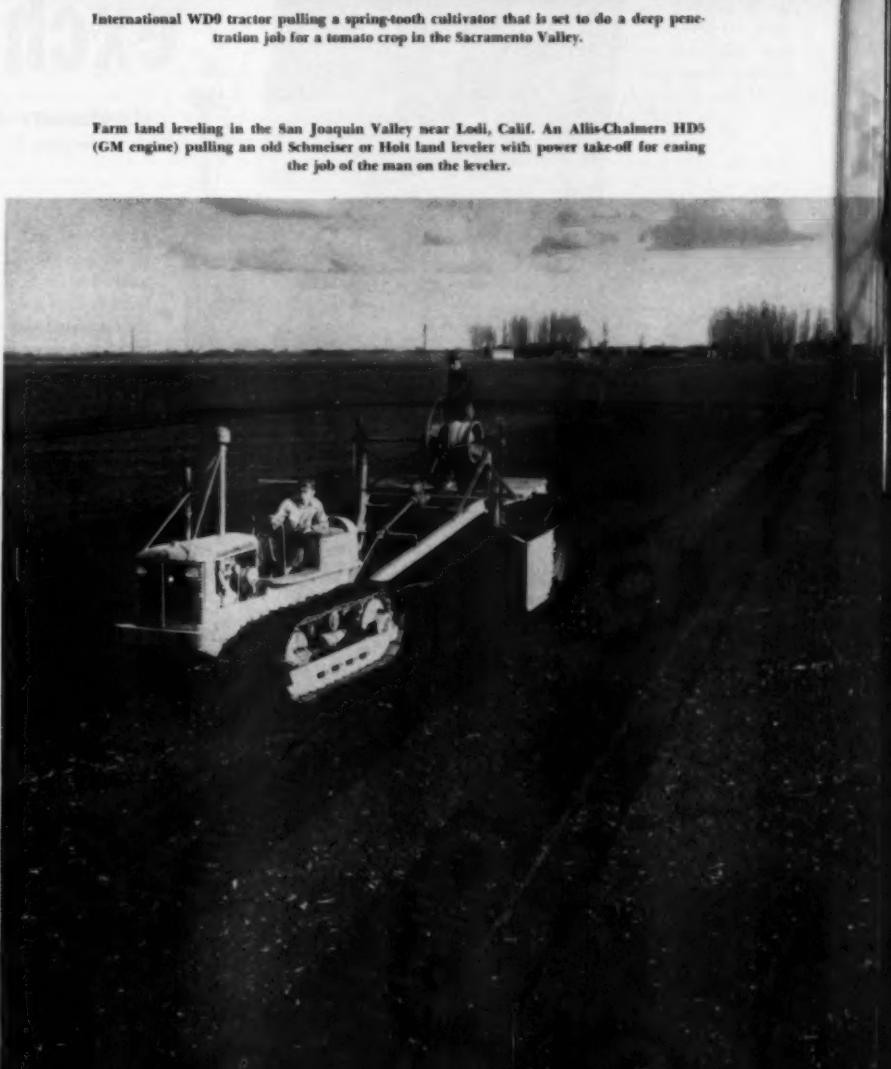
But the Nebraska test has just passed the wheel diesels of Massey-Harris and Oliver with flying colors. Now that Oliver has both wheel and crawler diesels to offer the farmer, their dealers are in an enviable position never attained in the past 20 years in competing for the irrigated western farmer's business. Minneapolis-Moline has just announced a tractor on which can be hung a whole series of farm machines for combining grain and seed crops, a 2-row corn picker-sheller, and other farm implements for doing the work of a farm throughout the year. They call it the Uni-Tractor, and the same idea was being developed by at least one other full line manufacturer five years ago and should now be ready. It opens up a whole trend in wheel tractors with potato planter and digger, mower, side delivery rakes, green crop harvester, combined harvester, corn picker, beet harvester, sprayer, cotton picker, etc., all from one power plant that can be changed over from one machine to the next as needed through the farming year. It's due and it is sure to be a diesized power plant because of the economy and demands of the farmer for this super-equipment that meets his demands for doing the job better, quicker and cheaper.

Caterpillar D6 pulling new special beet loading "Step-In" built by Dan Best to solve one of his harvest labor problems, making it easier and faster for his crew of Mexican field hands. Note the special slow-down gear arrangement on tractor to permit driver to crawl along at the speed of the loading. Conveyor from beet field on opposite side drops beets squarely in the center of the load without spilling.



International WD9 tractor pulling a spring-tooth cultivator that is set to do a deep penetration job for a tomato crop in the Sacramento Valley.

Farm land leveling in the San Joaquin Valley near Lodi, Calif. An Allis-Chalmers HD5 (GM engine) pulling an old Schmeiser or Holt land leveler with power take-off for easing the job of the man on the leveler.



*Dirty Water can't "Shut-down"...*

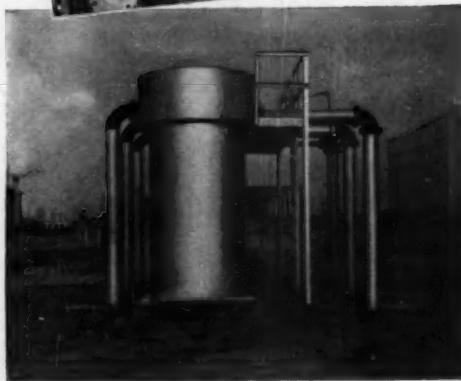
**Vogt**



# film type exchangers

(Condensers—Coolers—Evaporators)

Patent Nos. 1,935,270 - 2,057,597 - 2,424,441



TOP: Four units at Newton Falls, Ohio  
Municipal plant cool water for diesel  
engines and a lubricating oil cooler.

BOTTOM: Jacket Water Coolers serving  
engines of 7,300 HP in the compression  
plants of a Western Oil Refinery.

River water, well water or brackish water are all alike to this exchanger because it can be cleaned while in operation! The water distributing ferrules need only be removed successively for the cleaning brush or tool whereby the tubes receive additional water which sluices away the dislodged dirt.

Vogt Film Type Exchangers are operating with real economy of first cost, operation and maintenance in power, petroleum, and chemical industries. They serve as Jacket Water Coolers, Feed Water Heaters, Hydrocarbon Evaporators, Sulphuric Acid Coolers, and Sulphur Dioxide Condensers, and can be designed to cool or heat any liquid and to condense or evaporate any fluid.

[ Bulletin HE-7 describes typical installations of Vogt Film Type exchangers and is available upon request. ]

**HENRY VOGT MACHINE CO., LOUISVILLE, KY.**

Branch Offices: NEW YORK, CHICAGO, CLEVELAND, DALLAS, PHILADELPHIA,  
ST. LOUIS, CHARLESTON, W. VA.

# NEW CANADIAN TOWING SERVICE

**G**RIFITHS Steamship Company, Limited, Vancouver, B.C., announces the inauguration of tug and barge service between Puget Sound and British Columbia ports of Harmac, B.C., and Watson, B.C., for the carriage of bulk caustic soda, chlorine, and other commodities. Griffiths Steamship Company, Limited, has entered into long-term contracts with the Columbia Cellulose Company, Limited, of Prince Rupert, B.C., and the H. R. MacMillan Export Company, Limited, Pulp Division, of Harmac, B.C., for the transportation of chemicals. This marks the return of the Griffiths interests, formerly known as the Coastwise Steamship and Barge Company, Limited, and founded in 1912, to the British Columbia coasting trade. Both liquid caustic soda and liquid chlorine will be furnished by the Hooker Electrochemical Company of Tacoma, Washington.

Griffiths Steamship Company, Limited, recently purchased a LST hull "CT2" which has been converted to a combination car barge, bulk caustic soda and chlorine carrier. The barge now bears the name of *Grifco* and is the third vessel to carry the name for the Griffiths Company. The first *Grifco*, 2,500 deadweight tons, was built in Seattle, Washington in 1922 and was used to carry ore from British Columbia to the Tacoma Smelter. It was sold to the Inter-Island Steam Navigation Company in 1927. The second *Grifco* was 3,800 deadweight tons and was purchased in 1927 from the Los Angeles Lumber Products Company. It was likewise used in the British Columbia ore trade and was sold in 1946 to Greek interests. The new barge is 277 ft. long by 50 ft. beam, with a loaded draft of 8 ft. It is equipped with six individual tanks capable of carrying 1,500 short tons (50% caustic soda solution) and special tanks equipped to carry 150 tons of liquid chlorine under pressure. The plans for conversion of the barge *Grifco* were carried out by Carl J. Nordstrom, Naval Architect, Seattle, Washington, and the conversion work was performed by the Victoria Machinery Depot, Victoria, B.C.

The Griffiths Company also purchased the former ATR type steam tug *Logmac* for use in this operation. This tug recently underwent conversion from steam to diesel at the B.C. Engineers and Shipbuilders Company, Vancouver, B.C. The new tug name is *Mogul*. This is the third vessel to bear the name. It is 157 ft. long and has a beam of 33 ft., and a 16-ft. draft. The first *Mogul* was built in 1885 at Tacoma, Washington and was 94 ft. long of 123 gross tons. The second *Mogul* was the ex-Navy collier *Caesar* purchased in 1923, and later sold to Consolidated Exporters in 1933. The new *Mogul* is now equipped with a 1,600-hp. Fairbanks-Morse 10-cylinder OP diesel engine with offset 2.5 to 1 Farrell-Birmingham reduction gear. The *Mogul* is also equipped with radar, Sperry steering gear, and gyro compass and the latest ship-to-shore telephone.

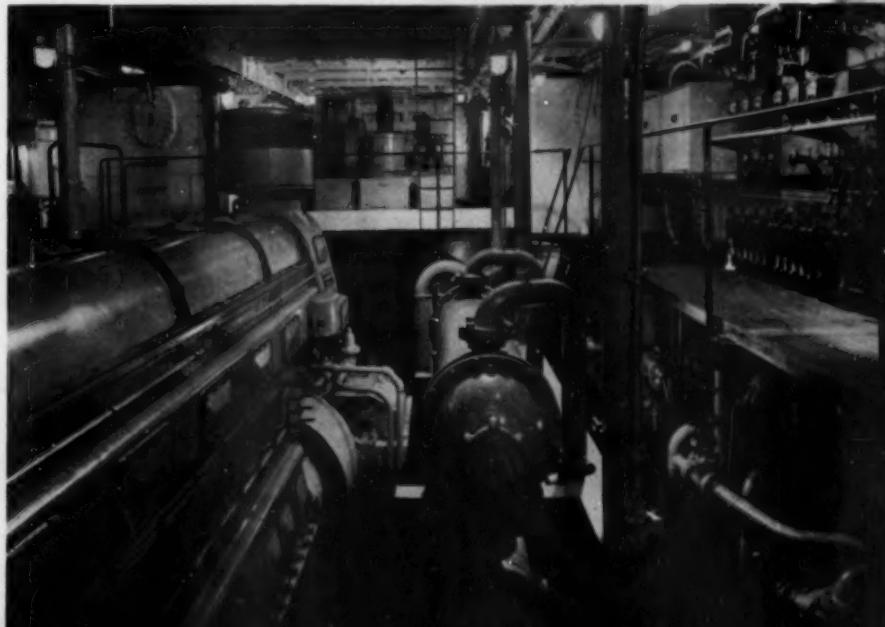


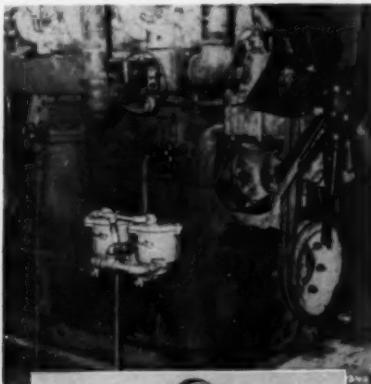
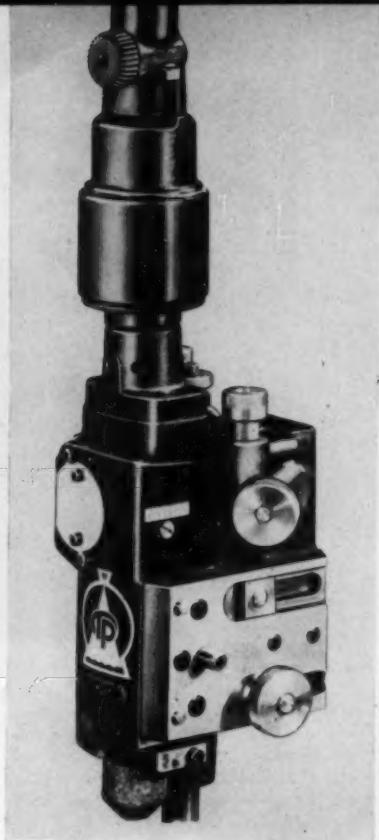
The conversion of the new tug was carried out by Mr. Marshall McGinitie, of McGinitie and McDonald, Consulting Engineers. The plans call for bi-monthly service to Harmac, B.C., and Prince Rupert, B.C., with the MacMillan pulp plant taking their chemical requirements of bulk caustic soda in the under deck cargo tanks and the chlorine in 55-ton railroad cars. The Columbia Cellulose Company, Limited, at Watson Island, will require bulk liquid caustic soda in the under deck cargo tanks, and the chlorine in specially designed 100 and 50-ton pressure tanks. This will be the first time on the Pacific Coast that bulk chlorine has been transported in fixed tanks on barges. The Griffiths Company and the Hooker Electrochemical Company developed changes in the U.S. Coast Guard rules and regulations to permit shipment of caustic soda and chlorine on the same barge or vessel. A new method of discharging has also

been developed for bulk chlorine at Prince Rupert, where there is a 21-ft. tidal range at this location. The specially designed 100 and 50-ton pressure tanks were built by the Vancouver Iron Works, Vancouver, B.C. They were built and tested at 500 lbs. and 300 lbs. respectively working pressure to conform to ASME code and U.S. Coast Guard regulations sub-chapter N.

The Griffiths Company also has available the sister Barge *Griffon* ex "CT1" which is now being utilized as a log carrying barge on the British Columbia Coast and it appears probable, in the not-too-distant future, that the additional barge will be converted to carrying chemicals and other commodities for the pulp and paper industry on the British Columbia Coast. James Griffiths & Sons, Inc., Seattle, Washington, will act as U.S. agent for the new operation.

Engine room of the tug *Mogul* looking aft showing main switchboard and main power plant 16,000 hp. opposed piston Fairbanks-Morse diesel.





## PORTABLE VALVE SEAT GRINDER

**A Handy Tool for Re-Grinding Large Diesel Valve Seats and Counterbores**

By SIDNEY HOFFMAN

**A** NEW portable valve seat grinder, especially designed for large internal combustion engines with inside seat diameters from 2½-inches to 12-inches, has been developed by Thompson Products, Inc. The unit can be used for grinding both valve seat faces and counterbores within the size range, and regularly holds concentricity to .003-inches. It is capable of accomplishing in a few minutes what normally require hours by ordinary reaming and hand lapping methods. The Thompson portable grinder is of extremely simple design and construction, and may be used in the shop or directly on the engine, wherever air pressure is available. It consists essentially of a grinding unit with easily accessible controls, a wheel dressing unit and an air motor drive. The grinding unit is driven at 10 rpm. around a pilot centered in the valve guide, with the grinding wheel operating at 12,000 rpm. Only a small portion of the wheel contacts the seat surface, eliminating egg-shaped seats, chatter and downtime for wheel dressing. Greater

accuracy and a smooth, low micro-inch finish result. Grinding unit housing and wheel dressing unit are of cast iron to absorb vibration.

The wheel dresser is attached directly to the grinding unit for the wheel dressing operation, thus permitting dressing wheels without removing the grinder from the pilot. A diamond tool performs the dressing operation, and any angle from 0° to 90° can be obtained. Another feature of the grinder is the air motor which drives the grinding unit. It provides the greatest horsepower per pound of weight (3½ pounds) and produces high initial torque. Air pressure from 90 to 125 psi. from a high volume tank is recommended. Air operation of the grinder is an important safety feature when using the unit in gasoline plants, compressor stations or wherever a fire hazard exists. Full details on the Thompson portable valve seat grinder, including specification, can be obtained by writing DIESEL PROGRESS, File 87, P.O. Box 8458, Cole Station, Los Angeles 46, California.

**M**UCH breakdown expense and lost time due to overheating troubles in liquid cooled internal combustion engines can be eliminated by means of an ingenious and inexpensive electro-chemically activated cooling system filter developed by Spark-O-Liner Corporation. Its efficiency attested to by many national fleet operators in the trucking field, this filter, the Perry cooling system filter, is also being made for passenger car application. Operators of tractor equipment and stationary engines, aware of the strides made by this device in the trucking and passenger car fields, have found that the filter can effect marked savings in maintenance costs due to engine breakdowns and reduction of lost working time due to such breakdowns. This is especially important in mine pumping operations, in oil field drill rig and pumping equipment, earth moving equipment such as crawler tractors, and all activities where continuous, uninterrupted engine service spells the difference between success and failure or profit and loss. Fully important however is the use of the new cooling system filter by individuals such as operators of farm tractors and mechanical cotton pickers, etc., who often encounter engine damage and overheating troubles due to the use of dirty, rust-laden or lime-ritten water in the cooling system. Tractor operators can avoid much needless engine repair and radiator rodding expense and prolong the life of the motor through the use of this filter. It assures a constantly clean cooling system and prevents scale insulation of block, water jackets and radiator thus eliminating the main cause of burned valves, scored pistons and other engine damage.

Tests of the Perry cooling system filter by filter engineers have revealed that the electro-chemically activated filter placed in the coolant line will soften and clean the water or coolant and break up the accumulation of lime, rust, scale and sludge deposits. Through the use of a filter of this type, engineers have found that the foreign matter is kept in suspension in the coolant and, as it gradually goes through the process of filtering, this residue is deposited within the filter resulting in clear coolant circulation that cleans the radiator chambers and engine block. By thus preventing overheating, the operator gets better and more productive performance. The cutaway view of the Model TB filter illustrates its simplicity and the ease with which a replacement of the filter element can be made. The element should be replaced at recommended hours, depending on the type of equipment on which it is used. Three models of the filter are available: Model P for capacities up to 6 gallons; Model TB for capacities from 6 to 15 gallons, and Model TB Special for capacities from 15 to 30 gallons.

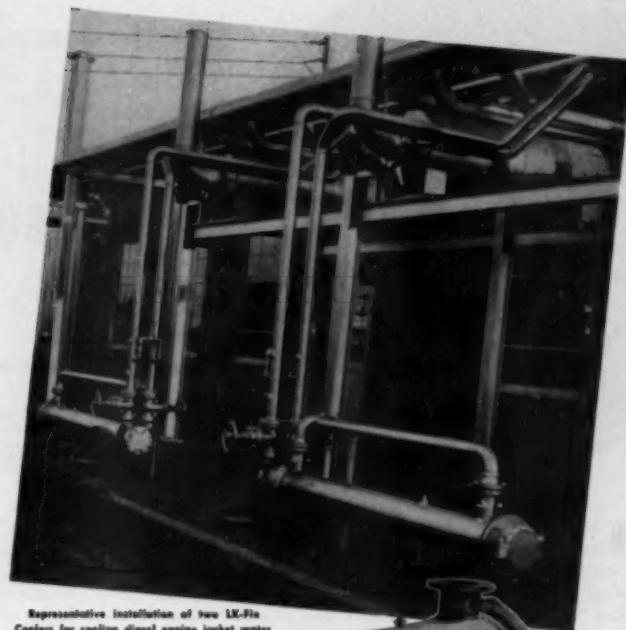
It is pointed out by engineers familiar with the Perry cooling system filter and its cost saving aspects that the cost of one or two radiator cleaning and rodding jobs, or the cost of one premature engine overhaul, will more than pay for the original installation, after which the only upkeep cost is periodic change of filter element. For more complete details and information, address an inquiry to DIESEL PROGRESS, File 86, P.O. Box 8458, Cole Station, Los Angeles 46, California.

*Why*

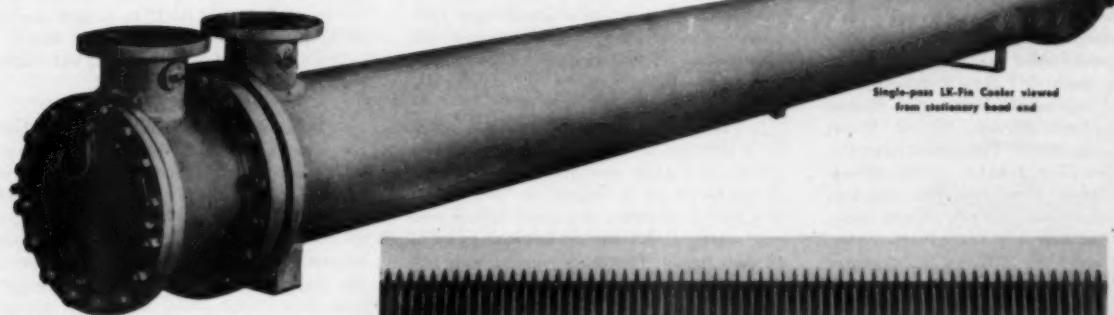
# LK-FIN

*means a more  
effective...compact  
and economical*

## Lube Oil or Jacket Water Cooler



Representative installation of two LK-Fin Coolers for cooling diesel engine jacket water



Single-pass LK-Fin Cooler viewed from stationary head end

Portion of the helical-finned element used in the LK-Fin Cooler

It's because of the fins on the cooling elements. These fins greatly increase the external heat transfer surface . . . enable a considerably shorter tube to perform the same cooling effect that requires a much longer bare tube.

The results . . . a more compact cooler because of the more effective heat transfer surface . . . a more economical unit because of the shorter tubes and shell.

What diameter . . . thickness . . . pitch . . . should the

fins be to accomplish these results? That's where G-R's unmatched know-how comes in . . . a knowledge gained from 20 years of experience in building finned-type heat exchangers and the results obtained from many tens of thousands of installed finned-tube units.

And the exclusive use of LK-Fin tubes is only one of the many distinctive features of these coolers. Write for bulletin describing them in detail, with rating tables and selection data.

THE GRISCOM-RUSSELL CO., 285 MADISON AVE., NEW YORK 17, N. Y.

# GRISCOM-RUSSELL

PIONEERS IN HEAT TRANSFER APPARATUS





## WHAT'S GOING ON IN ENGLAND

CONDUCTED BY HAMISH FERGUSON

Hamish Ferguson was appointed Secretary to the Diesel Engine Users Association in London in 1944. Previously senior technical assistant to Diesel and Insurance Consultants, London, and for several years with English Electric Company in the designing and erection of large diesel generating plants. Mr Ferguson continues to do independent consulting work.

**I**N 1949 a team of fourteen British engineers representative of management, designers and the workshops, visited the U. S. under the auspices of the Anglo-American Council on Productivity to study American production methods as applied to the manufacture of internal combustion engines. The plants visited included the following: Waukesha Motor Co., including Grede Foundry, Waukesha, Wisconsin; Le Roi Co., Milwaukee, Wisconsin; Wisconsin Motor Corp., Milwaukee, Wisconsin; The Buda Co., Harvey, Illinois; The International Harvester Co., Melrose Park, Illinois; The Electro-Motive Division, General Motors Corp., La Grange, Illinois; Caterpillar Tractor Co., including Caterpillar Foundry, Peoria, Illinois; Continental Motors Corp., Muskegon, Michigan; Detroit Diesel Division, General Motors Corp., Detroit, Michigan; Hercules Motors Corp., Canton, Ohio; Bucyrus-Erie Co., Milwaukee, Wisconsin; The Nordberg Manufacturing Co., Milwaukee, Wisconsin; The Ohio Crankshaft Co., Cleveland, Ohio; The American Locomotive Co., Schenectady.

It was the unanimous opinion of the Team that the general level of productivity in the American industry is very considerably higher than in the British. The Team was convinced at the end of its tour that at least the majority of British plants had much to learn about the full utilization of man power and the efficient use of machine tools. The value of the visit and the Report arising from it are well summed-up in the recommendations put forward which read as follows:

"It is essential that everyone in the country should understand the benefits that are to be gained from high productivity, and the resultant position of the country if productivity is not raised. There have been many references to this in the press and in Government publications and pamphlets, but many still fear that higher productivity might result in unemployment, and the fact that higher productivity will provide a higher standard of life, with more goods within the reach of more people, is even yet not understood by all.

"It must be remembered that progress will continue, and better methods will be tried out and car-

ried into effect by one nation or another. The country not keeping pace with the times will go under, and the standard of living will gradually fall to starvation level, particularly if that country has to import the major portion of its food. It therefore is necessary that the fundamental principles of higher productivity should be stressed on every possible occasion by all with a sense of duty to their country, to their factory, to their community and to themselves. The following are our findings and recommendations:

"(1) The wages structure of the engineering industry is out-dated. It is essential that a simplified system, based where applicable on the principle of 'rate for the job' be adopted. (2) There should be a general acceptance of properly applied time study, wherever applicable, by the rank and file of all trade unions. Time study, applied fairly and correctly under joint consultation, not only protects the worker but shows up inefficiencies in management and techniques, and is an essential aid to modern methods of costing. (3) The machine tool supply position, as regards high production and special purpose machines, is unsatisfactory. An assessment should be made of the effects on this country of exporting a considerable proportion of the output of the machine tool industry at a time when it has a back-log of orders, and is trying to deal with heavy re-tooling programs in the automobile and engineering industries. Is there need for an expansion of this industry?

"(4) With the expansion of the internal combustion engine industry, the supply of solid forged crankshafts for larger engines now constitutes a serious bottle neck. The industry should investigate the overall situation and assess approximate total requirements. How far would the acquisition and control of the Internal Combustion Engine industry, or a section of it, of a suitable and adequate forging plant serve to overcome this difficulty? (5) If proper incentives, so necessary to the achievement of higher productivity, are to be given, direct and indirect taxation should be lowered as far as possible, consistent with the country's financial position. (6) Greater attention must be paid by management to the efficient use of labor. The out-

put of each individual, rather than the overall output of the factory, is the point requiring study. Where a standard cost and budgetary control system is in use it should be the aim of management to use the information available effectively to control operator performance. (7) Incentive systems do not, by themselves, ensure maximum efficiency; it is necessary daily to check the performances of the operator against standard, so that defective tools, wrong methods, hard materials, and similar faults are shown up at once.

"(8) More consideration should be given to high production tooling methods, even for relatively small batch quantities, and fuller use made of compressed air, hydraulic and electrically operated fixtures and devices. The industry might consider the possibility of sending a team of production methods engineers to study this subject exclusively. (9) The handling of material in all its forms requires most careful consideration by all management. A greater degree of mechanization could be usefully applied in many British factories. The Report by the Specialist Team on Materials Handling in Industry deals with this subject. (10) More attention should be paid by the industry to the systematic and continuous training of all supervisory personnel not only in company organization, but in up-to-date methods of carrying out their individual duties. Coupled with this there should be a wider dissemination of company news and policy throughout the plant.

"(11) Design for production could still be improved. The closest co-operation between the engineering and production methods departments is essential if costs are to be lowered and output increased. More attention should be paid to the use of simple materials, thus reducing material costs and frequently simplifying machining. (12) Foundries, whether independent or controlled by the engine builder, must be educated to water test and dimensionally check important engine castings in the rough, also to provide ground location pads to the engine manufacturer's requirements for initial machining operations. This could save much of the time lost when casting defects come to light

... and now please turn to page 68 ...



Inner Circle: Col. Robert H. Morse—Fairbanks-Morse. General Levin H. Campbell—International Harvester Company. George W. Codrington—Cleveland Diesel Division of General Motors Corp. C. Paul Clark—Clark Bros. Fred W. O'Neil—Ingersoll Rand. Outer Circle: E. J. Schwanhauser—Worthington. William E. Butts, Enterprise. Robert H. Morse, Jr.—Fairbanks Morse. Harry T. Hill—Diesel Engine Manufacturers Association.

Down at Palm Beach, Florida on April 11th there was a highly useful and important gathering of some of the really "top brass" of the Diesel Industry. After a strenuous day given over to discussing ways and means of fitting their respective manufacturing facilities into the Mobilization Plan, an adjournment was taken to the after deck of one of the most palatial house boats afloat today—George W. Codrington's "Sea Play."

Incidentally "Sea Play" is quite a ship. To his own

extensive and practical sea-going experience Mr. Codrington has added that of an old-time yacht builder—John Trumpy of Annapolis—who built the "Sea Play," with the result that he has a craft which is commanding exceptional attention wherever she goes. The "Sea Play" is 80 ft. overall, 78 ft. on the waterline with a beam of 18 ft. Cruising draft 5 ft. Power plant—two General Motors Model 6-71 six cylinder diesels of 200 hp. each at 2000 rpm. plus a 10 kw. G.M. generator set. Cruising speed 12 knots.

An interesting meeting was recently held at State College, Pa. to show the results of four years' research on exhaust manifolds, sponsored by the Office of Naval Research, which is now nearing completion. This work was carried on by the Diesel Research Laboratory of State College.

The superior performance of some of the unconventional exhaust manifolds, developed over the past four years, was demonstrated to representatives from American Locomotive; Baldwin-Lima-Hamilton; Chicago Pneumatic Tool; Clark Bros.; Cooper Bessemer; Cummins; Fluor Corp.; General Motors.

H. A. Steiger of Penn State pointing and L. L. Bower; C. R. Flint; H. E. Greger; O. D. Treiber; J. E. DeLong; James Brady; William Burrows; Captain F. C. Wiesner; G. Wohlborg and F. M. Schulse looking on.



JUNE 1951

# THOMAS

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FOR POWER TRANSMISSION  
REQUIRE NO MAINTENANCE

Patented Flexible Disc Rings  
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power and provide for mis-  
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Thomas Couplings have a wide  
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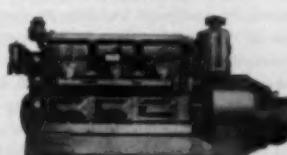
½ to 40,000 HP  
1 to 30,000 RPM

**Specialists on Couplings  
for more than 30 years**



THE THOMAS PRINCIPLE GUARANTEES  
PERFECT BALANCE UNDER ALL  
CONDITIONS OF MISALIGNMENT.

NO MAINTENANCE PROBLEMS.  
ALL PARTS ARE  
SOLIDLY BOLTED TOGETHER.



FOR SUCH TOUGH JOBS AS: DIESEL  
COMPRESSOR DRIVES, MARINE MAIN  
DRIVES, LOCOMOTIVE MAIN DRIVES,  
AUXILIARY DRIVES, ETC.

Write for the latest reprint  
of our Engineering Catalog.

**THOMAS FLEXIBLE  
COUPLING CO.  
WARREN, PENNSYLVANIA**

# E

# Exchange Your Diesel Maintenance Ideas

CONDUCTED BY R. L. GREGORY

## ADDITIONAL MAINTENANCE PROBLEMS

**A** PREVENTIVE maintenance program, no matter how religiously adhered to is more or less of a gamble. It does form a basis upon which to carry on maintenance, but just about the time that you feel that every thing is well under control and operating satisfactorily, something bobs up to give you a jolt and awake you from your dreams. That something can be any one or a combination of conditions which you are not looking for. Quite recently we were faced with such a situation in the operation of one of our units. We make it a practice to take indicator cards off our units every week and is customary we took the usual cards a couple of weeks ago and from them, conditions looked satisfactory. The following week the same procedure was followed and much to our surprise we noted that the compression was decidedly low on this particular cylinder.

Since new rings and an overhaul of this particular piston had been consummated only about a month previous, we felt that the trouble must lay outside the piston and rings. First we tested the fuel pump and found some slippage there so removed it and checked it independently from the system. The barrel and plunger seemed to be in pretty fair shape as was the delivery valve, but in order to satisfy ourselves we installed a spare pump. When tested on the unit this pump also showed slippage so it was evident that the trouble lay elsewhere.

The next move was to remove the nozzle holder and atomizing equipment and here we discovered the seat of the trouble, when the nozzle cap nut was removed and the nozzle taken out. The small extension of the atomizer plunger, which is actuated by the spindle and pressure adjusting spring had broken off and jammed in the end of the guide hole in the nozzle holder. This in turn had damaged the spindle and caused the atomization to become defective. The point is that when we overhauled the unit atomizers about three weeks previously all atomizers were cleaned, inspected and pressure checked. This is done religiously every three weeks and at that time no condition was noted which would indicate future trouble. However this has happened to three different nozzles within the period of the last few months and since that is the first trouble of this nature which has

been encountered in over three years of steady operation it would lead one to believe that some change has occurred in the processing and hardening of these parts within the last few months. Whether this is the situation cannot be immediately determined until such time as the injured nozzle plungers can be examined and analyzed, by the manufacturer. This nozzle has been sent in for such an analysis. At any rate, such an incident just proves that no matter how religiously you follow a maintenance program and how often you check your equipment, conditions will arise in parts and manufacturing methods over which you have no control, that will affect daily operation.

Another incident might be cited which will substantiate this point in maintenance. We have in our plant an air injection unit on which the scavenging air is supplied by a three stage compressor consisting of the conventional low pressure stage, intermediate pressure stage and high pressure stage. The valves in these various stages are plate valves held in place by valve springs, a type with which we are most all familiar. In such a type compressor we know that these valve plates must be true as to face conditions and also as to dimensions. We further realize that the tension of the springs must be uniform for the various stages in which they are used. Some time ago we began to experience the collapsing of these springs in increasing numbers. No abnormal heat conditions were noted and it was finally determined that the springs were being made of material not up to standard. After taking the matter up with the manufacturer we eventually secured the proper springs which stood up under the abuse to which they naturally are subjected.

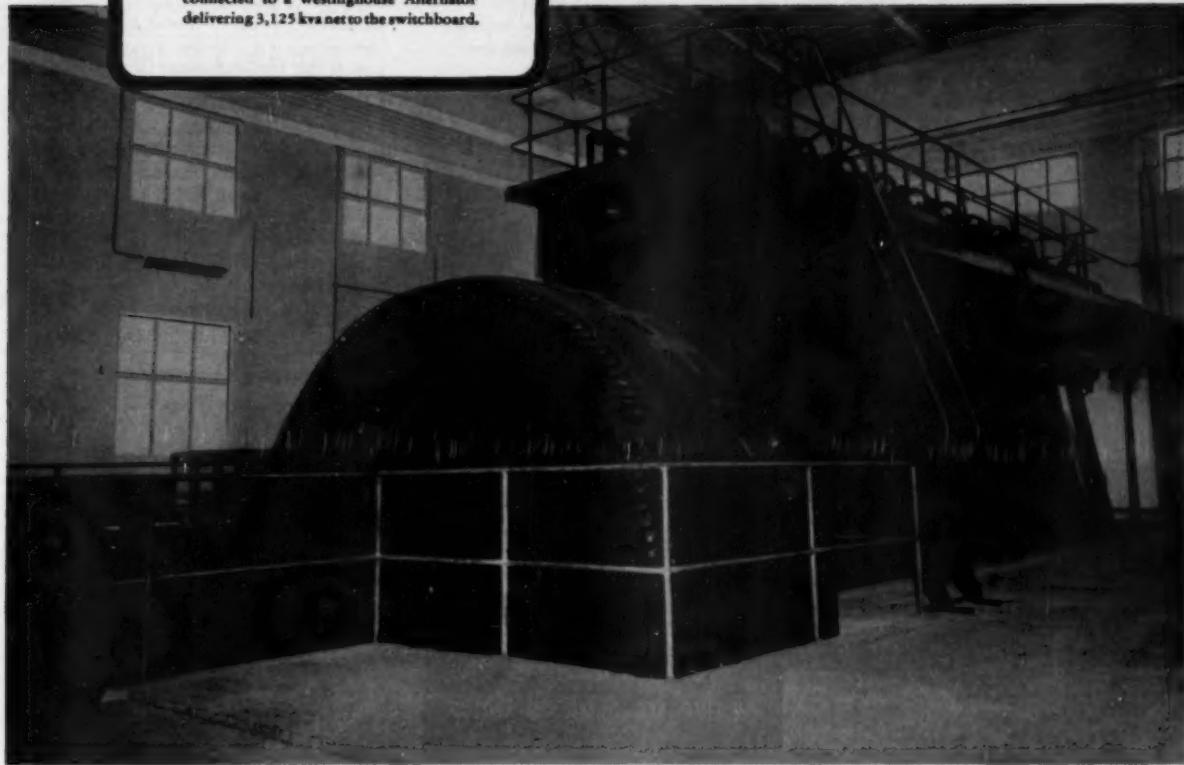
The next problem we were faced with was that of faulty valve plates. When installing these valve plates in the valves, we always make it a practice to carefully lap the valve plates to the valve seats. The maintenance men doing this work began to complain about the valve plates and the time it was taking to lap them in and secure a proper fit to the valve seat. We got out our surface plate and checked the valve plates in our spare stock and found that the majority of the plates were warped and did not run uniform as to surface, thus requiring more time in lapping in. This too

was corrected in due time but it became necessary to change to a different make of valve plate in order to overcome the difficulty. And so it seems to go, there is always some condition arising to change the normal operation of functioning parts. It may be due to the fact as explained to the writer by one manufacturer's representative, that with conditions as they are today a lot of these parts have to be jobbed out to other manufacturers, who are either not equipped to manufacture them satisfactorily or have not had the experience and know-how to make the parts properly.

This situation is not confined to unit parts alone but does exist to some extent all along the line, fuels, lubricants etc. Our fuels today have a greater variation in analysis than has been known for some time. There seems to be more of a carbon residue content and sulphur content in many of them, all of which react on the proper operation of our units. Lubricants are not exempt from this situation and it has been noted that lubricants made to the same specifications in different refineries and from different crudes do not give the same lubricating results. This means only one thing in the final analysis and that is that maintenance crews and supervision alike must be on their toes more than ever to catch these difficulties and counteract them by immediately finding the cause and correcting same. Otherwise we may be expected to face many more problems than we have heretofore. Right along this line let it be said that it is our duty to cooperate with all our vendors, parts vendors, fuel oil vendors and lubricating oil vendors, so that when these abnormal and unlooked for situations arise they can also be apprised of them. They are interested in the efficient operation and maintenance of the units just as we who operate them are, but they cannot be expected to solve problems which they may be hundreds of miles away from. So if we expected the most from our units lets cooperate with them one hundred percent. They will appreciate it and can help us solve some of these unforeseen difficulties.

Much more could be said along this line of unforeseen maintenance and many more examples given, but space does not permit us to go into it further than giving these few examples.

This is the first American-made engine generator unit installed at the power plant of the Bermuda Electric Light Co., Ltd. The Nordberg Diesel Engine is direct-connected to a Westinghouse Alternator delivering 3,125 kva net to the switchboard.



## This generator unit turned the tide at Bermuda

Here is the first American generator unit installed at the Bermuda Electric Light Co., Ltd. Prior to 1939, all the generating units were of British make. This unit changed the pattern . . . consisted of a Westinghouse Generator and a Nordberg Diesel Engine. The outstanding performance of this unit was responsible for another similar installation in 1950.

Westinghouse Generators create such acceptance because of their reliability—long life—performance. Once you specify Westinghouse you'll always specify Westinghouse. Take the fabricated steel rotor . . . it has been designed with such a high factor of safety that it is practically unbreakable. The all-steel frame makes possible a stator assembly having maximum strength and the permanent tightness of core that is necessary for a quiet, smooth-running machine. Electrical efficiency is tops, too . . . materials are so proportioned that

the maximum efficiency of conversion is obtained from three-quarters to full load.

Call your Westinghouse Power Apparatus Specialist for complete consultation on your generator installations. He will work with you on the design, selection and application of the right equipment. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-10362

YOU CAN BE SURE . . . IF IT'S  
**Westinghouse**  
A-C GENERATORS



ENGLAND... continued from page 64...

...continued from page 64...

in the production line. (13) There should be a greater interchange of information on production methods between firms in the industry to the ultimate benefit of all concerned.

(14) Both employers and trade union organizations should examine, in detail, all practices which might in any way hamper the achievement of maximum output. We would particularly refer to the problem of skilled and unskilled workers remuneration; to the apprenticeship system and all that this implies in regard to a skilled trade; to time study and its applications, wherever practicable, to industrial operations; and to the operation, by one

man, of more than one machine, as the time cycle allows." The Report was presented at a luncheon in June, 1950, attended by the Minister of Supply, the Chairman of B.I.C.E.M.A., the Director-General of the Federation of British Industries and the General Secretary of the Trades Union Congress. During the speeches considerable stress was laid on the high income tax rates and general lack of incentives as being a factor of major importance in hindering the speeding-up of production.

#### Protective Maintenance Encouraged

Operators of Cummins diesels are being urged by the service department of Cummins Engine Company of Columbus, Indiana, to establish protective

maintenance programs. "Protective maintenance," according to H. H. Hall, Cummins' general service manager, "not only is important in reducing operating costs, but it is especially valuable during this period of critical material shortages." The company's definition of "protective maintenance" is simply complete and adequate maintenance for diesels. It includes all periodic and progressive maintenance operations needed to obtain maximum periods of trouble-free service at the lowest possible cost. The program also includes the equipment the engine is powering.

For the benefit of Cummins diesel users, the company has issued the Service Bulletin—"Protective Maintenance Increases Profits." Although this guide does not fit every operation it will, however, give the operator a basic protective maintenance program which can be changed as the experience of the operator dictates. This recommended maintenance program bulletin No. 12 can be obtained from any Cummins dealer or by writing Cummins Engine Company, Inc., Columbus, Indiana.

#### Fawick Names Treasurer



Frank J. Mack was elected treasurer of the Fawick Airflex Company, Cleveland, Ohio, at a recent meeting of the company's board of directors. The appointment, announced by R. S. Huxtable, vice-president and general manager, took effect immediately. Mr. Mack is a native Clevelander, having been educated in Cleveland public schools and graduated from Ohio University. His entire career has been spent with local industrial firms. After ten years at Cleveland Diesel Division of General Motors, he entered the Fawick organization in 1948.

#### GMC Diesel Units Purchased

Pacific Intermountain Express Company has revealed the transition to an entirely new fleet of diesel tractors on its eastern divisions between Kansas City and Chicago, and Kansas City and St. Louis. Mr. C. Eugene Johnson, executive vice president said that shortly after the first of the year the company began taking deliveries on thirty 150 hp. GMC model 740 cab-over-engine diesel tractors. He added that the tractors have received extensive modification under PIE supervision in Chicago to meet company requirements and specifications. Total cost of the new equipment and modifications will be in excess of \$350,000. The new equipment will replace tractors formerly operated under lease. The inauguration of the new fleet is in line with the company's policy of standardization of road equipment. This has simplified and reduced cost of maintenance and has been a factor in establishing leadership in safe driving records. Units operating east of Kansas City are equipped with 150 hp. diesels. Those operating west of Denver through the Rockies are equipped with 200 hp. engines. PIE has been experimenting with ten 300 hp. diesels to determine whether or not its operations on long upgrades may be speeded up with safety.

# Zero-Lash HYDRAULIC VALVE LIFTERS

—automatically maintain zero clearance in the valve train at all times



**Zero-Lash opens the door to:**

- Cam design improvement for optimum engine operating efficiency.
- Freedom from loss of efficiency from varnish and sludge.
- Perfect tappet adjustment for the life of the engine under all engine operating speeds and temperatures.
- Longer and better service for valves and seats.
- Silent valve train operation.
- Smoother idling.

Eaton engineers welcome the opportunity to discuss application of its multiplicity of hydraulic valve lifter designs to engines proposed or now in design.

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### New Splice Cap Crimping Tool

The Buchanan splice caps for "pigtail" splicing of electrical wires are now available in an improved open-end construction which considerably facilitates their installation and inspection. These new open-end splice caps insure that wire insulation is always flush with the splice cap for maximum circuit protection and that wires are always



inserted to the full depth of the splice cap for maximum joint efficiency. Only two sizes of splice caps are required for all most frequently used combinations of two or more wires ranging all the way from two No. 18 to three No. 8. Quickly applied snap-on insulators or fixed insulating valve eliminate the necessity for taping of joints and insure against insulation breakdown in service. The hand operated "pres-SURE-tool" which installs both sizes of caps also installs the manufacturer's Termend lugs on all sizes from No. 16 to No. 8. This tool features an exclusive four-way crimping action which insures permanent connections of maximum electrical and mechanical efficiency and is equally effective on solid or stranded or on combinations of solid and stranded wires. Weighing just one pound, this tool is only eight inches in overall length and is provided with easy-grip handles protected with vinyl tubing. All splice caps and Termend lugs are fully approved by both Underwriters' Laboratories, Inc. and Canadian Standards Association. For catalog folder giving complete details on the "pres-SURE-tool," splice caps and Termend lugs, write DIESEL PROGRESS, File No. 88, P.O. Box 8458, Cole Station, Los Angeles 46, California.

### Standard Stoker Co. Changes Name

The Standard Stoker Company, Inc. has changed its corporate name to Read Standard Corporation. This is a change in name only. There has been no change in ownership, management or personnel. Operations under the new name are separated into two major divisions, namely: the Bakery-Chemical Division and the Blower-Stoker Division. The company has diversified its activities in the past several years. Present products include Standard Stokers for railroad and industrial use, Readco bakery machinery, Readco chemical processing equipment and axial flow positive pressure Standardaire Blowers for varied industries. The Erie, Pa. plant will be manufacturing and engineering headquarters for the Blower-Stoker Division with sales headquarters in New York. Executive and divisional sales offices will be maintained, as heretofore. All business of the company will be conducted under the name Read Standard Corporation.

*Less time  
for a change!*

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### FOR LUBRICATING, FUEL OR INDUSTRIAL OILS

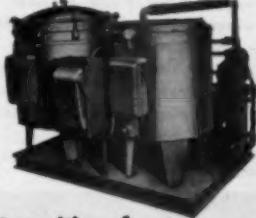
Two sizes: I-718 for 7 x 18 Navy-size throw-away cartridges in multiples of 1, 2, 4, 7, 9, 14, and 18 cartridges. I-1118 series, for either repackable or throw-away cartridges, in multiples of 1, 2, 3, 4, 6, and 8 cartridges.

### Simplify Cartridge Replacement with Exclusive Cover- Lifting Device

Along with efficient filtering at high flow rates, Hoffman Cartridge Filters provide maximum service convenience. Exclusive cover-lifting device speeds up cartridge change — either the 7 x 18 size, for Navy throw-away cartridges, or the 11 x 18, for repackable or throw-away types, offer this feature. Swing bolts fasten the cover — an additional advantage for cartridge changes.

Write for bulletins A-703 and A-649 respectively.

### Complete Recovery of Used Oil



### -The HOFFMAN OIL CONDITIONER

Removes insolubles, as well as solubles, to cut new oil costs. Unit consists of Hoffman Vaporizer (to remove oil, gas, moisture and fuel dilution) . . . Cartridge Filter to remove solubles. Mounted on a common base . . . only 2 moving parts . . . no steam or water connections.

Capacities of  
50 to 600 g.p.h.

Write for Bulletin A-667 and A-668

**FILTRATION ENGINEERING SERVICE . . .** For the right answer to your filtering problems, a Hoffman filtration engineer will survey your requirements and furnish recommendations based on detailed analysis of all factors. Ask for this service — There is no obligation.

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FILTRATION

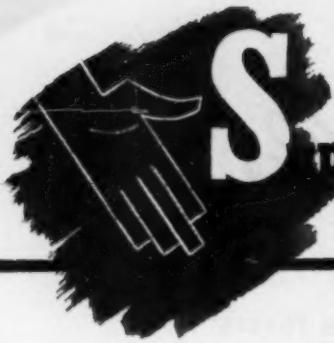


DIVISION

UNITED STATES HOFFMAN MACHINERY CORPORATION

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# Supervising & Operating Engineers Section

CONDUCTED BY R. L. GREGORY

## Single Stage Turbo Blowers as Source of Scavenging Air

WE WHO are connected with the operation of the larger slow speed types of diesel units, are aware of the fact that the equipment which supplies the scavenging air to these units is of the utmost importance. This is true whether this equipment is used on the air injection type of unit or on the more mechanical injection unit, and this equipment varies in characteristics with various makes of Diesels. Mainly it consists of either a three stage compressor driven directly from the crankshaft and an integral part of the unit, such as the one shown in the upper right hand corner of Figure 1, or a similar compressor separately driven. In later years many engineers have preferred the blower as a source of scavenging air supply and these two can either be driven directly from the crankshaft or motor driven as shown in Figure 2. Since the latter type is becoming more popular, it will be the purpose of this article to discuss this type of blower, its construction, installation and operating and maintenance features. It does have several advantages, the primary one being that the leads of the motor which drives this type of blower are connected to the diesel generator leads direct, and as close to the unit as feasible. When the starting air is applied to the unit and it gets under momentum, the motor im-

mediately starts rotating also and picks up speed at a rate that when the unit is up to approximately one-fourth speed, the motor is turning the blower at a rate which will allow ample scavenging air to enter the scavenging header.

*Construction of blower:* This particular type of blower as shown in Figure 2 consists of a motor driven unit known as a single stage centrifugal type turbo blower, mounted on a one-piece bedplate. The rotor is supported on pedestal type sleeve bearings with the impeller overhung on one end of the shaft. As a rule one of these bearings is a combined journal and thrust bearing, but quite frequently a separate thrust bearing is installed. The inlet on this type of blower is axial and the discharge is tangential. One of the main advantages of this type of blower is the fact that the design and construction allows for the removal of the inlet nozzle, which gives easy access to the impeller for maintenance purposes. The casing is so constructed that it may be assembled with the discharge nozzle pointing in any direction within the limits of its bolt circle.

The impeller is of the semi-enclosed type and is equipped with radial blades cast in one piece and

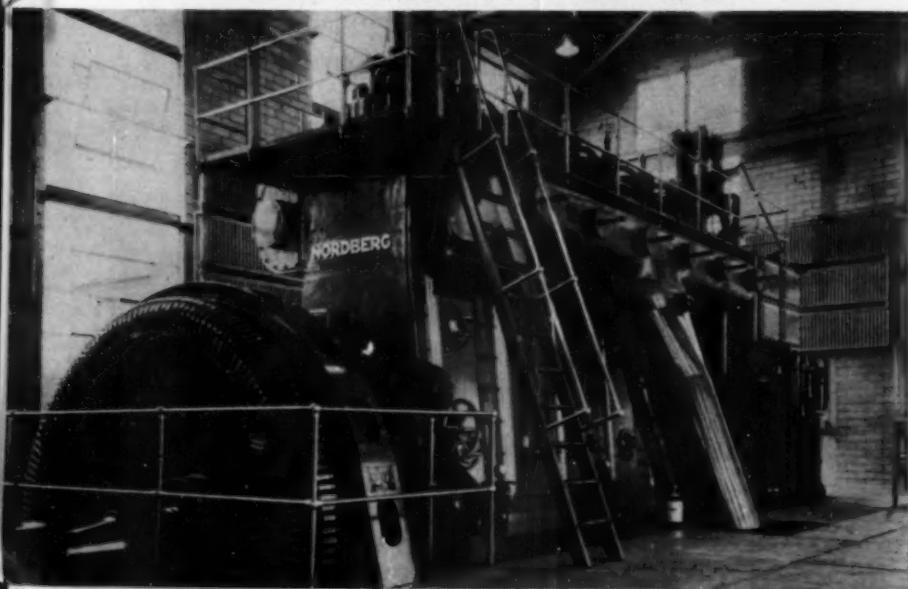
accurately balanced, and is mounted on the impeller shaft by using a light press fit, then keyed to and locked in position. The rotor is designed to operate below critical speed. Axial balance of the rotor is obtained by locating the discharge seal at a predetermined diameter on the back plate of the impeller. The region behind the impeller is vented to the atmosphere or as in the case of the one shown is connected to the blower inlet by means of an equalizing pipe. With such an arrangement of the seal the thrust due to pressure on the face of the impeller is approximately equal to the thrust on the back of the impeller and residual unbalanced thrust is cared for by the thrust bearing.

*Lubrication:* The lubrication system on this type of blower consists of a combination of oil ring and pressure lubrication. The oil ring located in the sleeve bearings assure lubrication of those bearings during the starting and stopping periods. The pressure lubrication is supplied by an oil pump of the gear type driven directly from the blower shaft by means of a spiral gear. The oil supply is taken from an oil reservoir located in the bottom of the bearing pedestal, pumped through an oil cooler and thence to the bearing supply line. A relief valve is placed at the entrance to the bearing supply line and this permits any excess oil to spill back into the oil reservoir.

This pump supplies oil to the bearings from the bottom at a pressure high enough to keep the bearings flooded with oil at all times. Sight gauges are located above each bearing and part of the oil supplied flows through these gauges so that it can be checked during the time the blower is in operation. After flowing through the bearings the oil drains back into the oil reservoir. Since this blower operates at a speed of 3600 rpm., it is necessary to use a high grade lubricant having a viscosity of 150 to 300 S.S.U. at 100° F.

*Erection:* With a unit of this type operating at this speed great care should be exercised in erection and alignment. First a suitable foundation and sub-foundation should be built to suit the unit. After placing the unit on the foundation it should be carefully leveled up, using steel shims and wedges placed near the foundation bolts. The wedges should be driven in with light blows to avoid any undue strain or springing of the bed plate. When the first alignment is obtained from

Fig. 1 showing three stage compressor driven directly from the crankshaft (upper right-hand corner) supplying scavenging air to a 2250 hp. air injection unit.



the bearings and coupling readings, the foundation bolts should all be pulled up fairly snug and the alignment then rechecked. Take great care in this alignment because the future operation of the unit depends upon the alignment. When you are satisfied that you have the correct alignment with the foundation bolts tight, you are then ready for grouting. Now grouting is important. You can use a 2 to 1 mixture of sand and cement, mixed fairly soft so that it will easily flow and the air can be removed by puddling and the bed plate should be entirely filled. This is the conventional method. However, such a mixture has a tendency to shrink as it dries and the writer prefers the use of embico in grouting this type of machinery. This too can be used at a consistency which will allow it to flow, but when it hardens there is no shrinkage and you have an excellent job. It is good practice to occasionally recheck the alignment periodically during the first year of operation.

After your grouting has hardened and prior to bolting up the two halves of the coupling, the direction of the motor rotation should be checked to see that the blower will operate in the right direction. This direction is generally clockwise for any direct connected blower but should be checked with the drawing to be certain. After determining the direction of rotation operate the motor uncoupled from the blower and with a scribe, mark a line on the shaft where it extends from the bearing housing. This will give you the running position of the motor shaft. Then couple up the two halves of the coupling, noting that the distance between the shaft ends is the same as designated in the assembly drawing.

Another important point to be observed in the erection of such a unit is the piping and pipe connections. Careful consideration must be given to this point to see that no weight strains are transmitted to the blower casing. All piping should be thoroughly cleaned before installation. Such types of units are primarily designed to operate as individual units. However, several blowers can be connected in parallel, but when this is done it is a requisite that a reliable non-return valve be placed in the discharge line. The operation of this valve

should be checked occasionally as failure to operate might cause the rotor to start up in the reverse direction, with possible damage to the bearings.

**Operation:** The relationship between the volume of inlet air and the discharge pressure for a given operating speed is called the "characteristic" of a turbine blower. This characteristic is shown graphically by the pressure volume curve, obtained by plotting the inlet volume against the discharge pressure as shown in Figure 3. From this curve it can be noticed that when the resistance on the discharge side of the blower is increased, the blower will develop a higher pressure to overcome the increased resistance, but at the same time, the volume of air handled will decrease. In this way, the discharge pressure of the blower can be built up until a certain critical pressure point has been reached. This critical point is called the "pumping point" or "pumping limit" of the blower.

As can be noted from the curve, when handling volumes of air below this "pumping limit" the operation of the blower becomes unstable, and the flow air is delivered spasmodically in puffs, thus causing the discharge pressure to fluctuate. This is a characteristic of all centrifugal blowers when "pumping." Pumping causes excess turbulence and noise but no harmful effects result from such operation unless long continued operation below the "pumping limit" is carried on, in which case one might have heating of the blower casing. Of course an increase in the operating speed of any turbo blower will increase the discharge pressure of the blower over its entire operating range. Also an increase in the density of the air handled will cause the blower to develop a higher pressure over the entire operating range, and since cold air is heavier than warm, a decrease of inlet temperature of the blower will move its characteristic curve upward. This condition explains why the air delivered to the scavenging system in the winter time gives better results than hot summer air.

Other operating characteristics should be noted at frequent intervals, such as sufficient lubrication, condition of the lubricant and cooling water conditions. The cooling water required for the oil

cooler will depend entirely upon the available water supply temperature. The water should be clean and of sufficient pressure to maintain a constant flow through the cooler, to prevent the bearing temperatures from exceeding 150° F. It is good insurance to check this point occasionally and log results, as the operator is doing in Figure 2.

**Maintenance:** The unit should be dismantled at least once a year for overhaul and maintenance. All parts should be carefully inspected and cleaned up and exceptional care should be taken not to damage the sealing strips, when dismantling or assembling the blower. Bearings should be flushed, preferably with kerosene and new oil installed unless periodic filtering of the old oil is carried on. Whenever there is an appearance of excessive sludging which indicates deterioration of the oil, the oil should be renewed. Oil filters and cooling tube bundles should be removed and cleaned up.

In dismantling the blower use the following procedure: First remove the inlet nozzle which then gives easy access to the impeller. Proceed then to pull the impeller, which is a light press fit from the shaft by means of a pulling rig, generally furnished by the manufacturer for that purpose. Since some of these impellers are made of cast aluminum do not use a torch or other direct heating.

After cleaning the impeller and other parts, just reverse the foregoing procedure. If necessary to heat the impeller do so by applying steam until the temperature reaches approximately 200 degrees. Since the impeller is on a taper fit, if all parts are thoroughly cleaned, it should press on easily. Never use a sledge or heavy hammer to drive the impeller on the shaft. The back plate of the impeller should bear against the shaft sleeve when the impeller is in position. Also be sure that the lock washer is properly bonded so the nut will not come off.

Due to the close tolerances between impeller and inlet nozzle always use the same thickness of gasket when reassembling. And above all use care and precaution in reassembling of sealing strips on the labyrinth gland. The photo in Figure 2 and descriptive material on this type of blower is used through the courtesy of the Allis-Chambers Company. From time to time articles illustrating other types of blowers will be published.

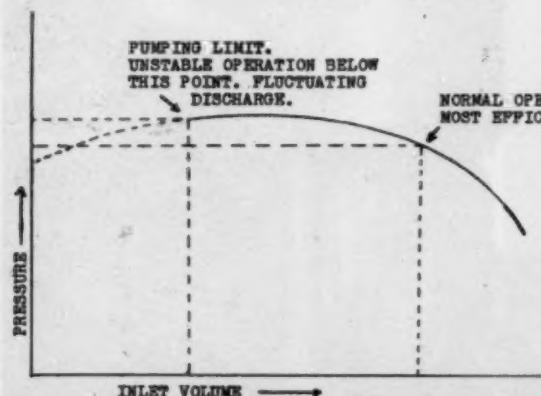


Fig. 3

Fig. 2 showing a single stage turbo-blower, supplying scavenging air to a 3600 hp. mechanical injection unit. Note that this blower is installed in a separate building opposite the main diesel room.





The annual meeting of the advertising managers, sales promotion managers and public relations directors of the members of the Diesel Engine Manufacturers Association took place April 4th at the Union League Club of Chicago. About thirty executives of the various companies comprising DEMA were represented and discussions pertained to the problems of the respective fields in which these executives operate. The highlight of the meeting was a presentation at the noonday luncheon by Volney B. Fowler, assistant to the president of the Electro-Motive Division, General Motors Corporation, in charge of advertising and public

relations. His subject was "Why America needs more diesel locomotives now." Henry J. Barbour, manager, sales promotion and public relations, Fairbanks, Morse & Co., Chicago, was chairman.

Pictured above, standing, left to right: J. D. Grace, Nordberg; Don House, Russell T. Gray Agency; Frank A. Uniack, GM-Cleveland Diesel Engine Division; Volney B. Fowler, GM-Electro-Motive Division; E. W. Manterfield, American Locomotive; W. P. Durbin, GM-Electro-Motive Division; James Love, Leo Burnett Agency; A. L. Decker, Buchen Agency; Robert S. Ogg, Baldwin-Lima-

Hamilton; George Frye, Chirurg Agency; Howard P. Sharp, Cummins; Allen P. Colby, National Supply; W. R. Miner, Cummins; Gene Bonnist, Cooper-Besemer; R. P. March, Worthington.

Seated, left to right: Joseph Kenny, Nordberg; H. H. Cohenour, Buda; J. R. Roberts, International Harvester; W. H. Kuhlman, International Harvester; Henry J. Barbour, Fairbanks, Morse; George B. Cushing, National Supply; L. A. Harlow, Fairbanks Morse; Marty D'Amico, National Supply; Harvey T. Hill, Diesel Engine Manufacturers Association.

**Honan-Crane Cuts Diesel Overhaul 50%**

A report from Lindsborg, Kansas  
Municipal Power Station says—

"Since installation of Honan-Crane purifiers, improvement in the condition of oil and in engine cleanliness has been so marked that city engineers plan to pull pistons *only once every two years* instead of every year as has been their custom."

**ONLY A HONAN-CRANE OIL PURIFIER GIVES YOU THIS KIND OF PROTECTION**

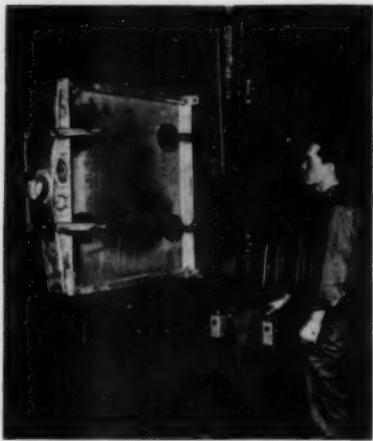
Write today for complete information

**HONAN-CRANE CORPORATION**  
202 INDIANAPOLIS AVENUE, LEBANON, INDIANA  
A SUBSIDIARY OF  
**HOUDAILLE-HERSHEY CORP.**

Honan-Crane purifier using Crankite (speciely processed Fuller's earth) continuously serves the 1200 HP, Model 33FD Fairbanks, Morse diesel fuel unit at Lindsborg, Kansas Municipal Power Station

## Speeds Heavy Radiator Repair Service

A new machine, named the "Hevi-Lift Positioner," which greatly facilitates radiator repair service for trucks, bulldozers, cranes, and similar heavy industrial equipment is now being placed on the market. The Hevi-Lift is the invention of Jack A. Bares, head of the Acme Auto Radiator Repair Co., and Ivan J. Krall, engineer. The first one was recently installed in the Acme shop and will be soon made available to other radiator shops throughout the country. The new machine gives one man touch-of-the-button ease in the handling and positioning of the giant radiators where formerly two or three men and hours of laborious work were required.



"The Hevi-Lift Positioner does all the work," says Mr. Bares who conceived the idea several years ago. "It places the heaviest radiator in any position for soldering, testing, repairing—eliminating manual fatigue which often causes faulty servicing. Faster service and more thorough repair than ever before is now made possible." Mr. Bares has set up facilities for the manufacture of the Hevi-Lift which can be easily installed anywhere. The new company will be called the Krall-Bares Co. The machine is especially designed for transit and diesel locomotive repair shops where only large radiators are repaired all the time. The need for such a machine has been felt for many years in the radiator repair trade and its operation at the Acme Auto Radiator Shop has proven "100 percent successful" according to service men there. Mr. Krall who is a graduate of the Illinois Institute of Technology, has assumed charge of the manufacture of the Hevi-Lift. For further information on the machine write DIESEL PROGRESS, File No. 84, P.O. Box 8458, Cole Station, Los Angeles 46, Calif.

## 16 Diesel Locomotives Ordered

The U. S. Steel Company has revealed that it has ordered 16 diesel-electric locomotives for use at its Fairless Works near Morrisville, Pennsylvania. Baldwin-Lima-Hamilton and Faikbanks, More & Co. will each supply eight of the 120-ton switchers with 1,200 horsepower. Delivery is expected to start in July.

JUNE 1951

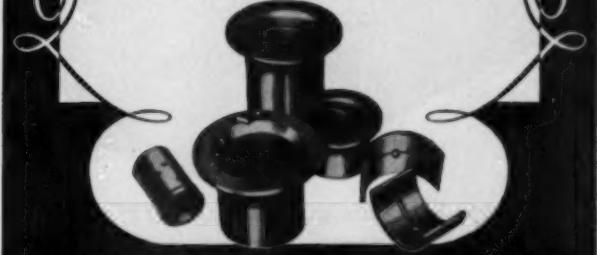
## JOHNSON BEARINGS

1901-1951



## Machinery and Bearings Both do a Better Job Today

**T**HE MECHANIZATION of the farm of 1951 demonstrates the tremendous strides made in equipment improvement in fifty years. Combines, tractors, electrified machinery and appliances do more work and are more efficient than ever before. Similar progress in sleeve bearings has been made by Johnson Bronze during this time . . . new bearing styles, refinement of bearing alloys, greater precision and closer tolerances. Johnson Thin Wall Bearings, Ledaloy Self-Lubricating Bearings, and Johnson Aluminum Alloy Bearings now replace the old style bearings of earlier days. Much of this farm equipment is able to out-perform and out-wear earlier models simply because of new and improved Johnson Bearings. For satisfactory performance specify Johnson Sleeve Bearings.



SLEEVE BEARING HEADQUARTERS Since 1901



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Call JOHNSON BRONZE at ATLANTA • BALTIMORE • BUFFALO • CAMBRIDGE  
CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DENVER • DETROIT • INDIANAPOLIS  
JACKSONVILLE • KANSAS CITY • LOS ANGELES • MINNEAPOLIS • NEW YORK • NEWARK  
PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE

### Heat Exchanger Bulletin

Descriptions and details of the Vogt Heat Exchangers are outlined in a new bulletin issued by the Henry Vogt Machine Company. These film type heat exchangers are made in a number of different designs for the major components and can satisfy the service requirements of most plants. The flexibility of design is exemplified by the following alternates: several water box designs, several standard water distributing arrangements on shell-side, tube-side discharging into pits or into a closed metal box. Units are used for cooling and condensing on the shell-side, but can also be used (though not open to atmosphere) for heating and vaporizing on the tube-side. For copies of this

descriptive Bulletin HE-7, write Henry Vogt Machine Company, Louisville 10, Kentucky.

### Two Appointments By Pesco Products

Appointment of G. E. Campbell as assistant works manager and of Donald A. Sutherland as industrial sales manager has been announced by R. J. Marshall, president of the Pesco Products Division of Borg-Warner Corporation. Mr. Campbell formerly was manufacturing consultant in the central offices of Borg-Warner in Chicago. He also has held two executive posts with the A. O. Smith Co., first as plant manager of the St. Paul, Minnesota, plant, then as assistant general manager of the Houston, Texas, works. Mr. Sutherland previously was

Pesco's industrial relations manager, a position which he assumed after having served as the division's eastern sales manager for industrial products. E. J. Foltz, previously Mr. Sutherland's assistant, has been promoted to the post of industrial relations manager.

### Diesel Summer School

The Texas Company Laboratories at Beacon, New York, are making their modern and extensive petroleum research facilities available for a five day course on diesel fuels and lubricants, starting June 25, 1951. The course will include classroom and laboratory work on the properties, test methods, manufacture and application of diesel fuels and lubricants. Enrollment will be limited to 15 and will be restricted to college and university professors teaching courses relating to diesel engines. There will be no fee charged for the course. Professors wishing to attend should send their application to the Diesel Engine Manufacturers Association, One North LaSalle Street, Chicago 2, Ill.

### Production Curtailed During Vacation Period

A critical shortage of materials will not permit full production at Caterpillar Tractor Co. during the vacation period, August 6-19, president Louis B. Neumiller has announced. He said that no prime products will be assembled during the two weeks. The company does plan to manufacture parts, however. It will also ship out machines needed by the military and essential civilian users. Mr. Neumiller had announced in January that the plant would try to maintain maximum output during the normal vacation period. "However," he said, "we are now definitely convinced that despite the great need for our product for both military and essential uses, the shortage of critical materials will not permit continuation of full production during the usual two-weeks vacation period." The continuing need for parts, he added, means that the company will produce all the parts for which materials are available during the two weeks.

*Since 1885*

# UNSURPASSED DEPENDABILITY...

Today's modern UNION Diesel products\* incorporate and pioneer improvements which assure unsurpassed dependability for your —

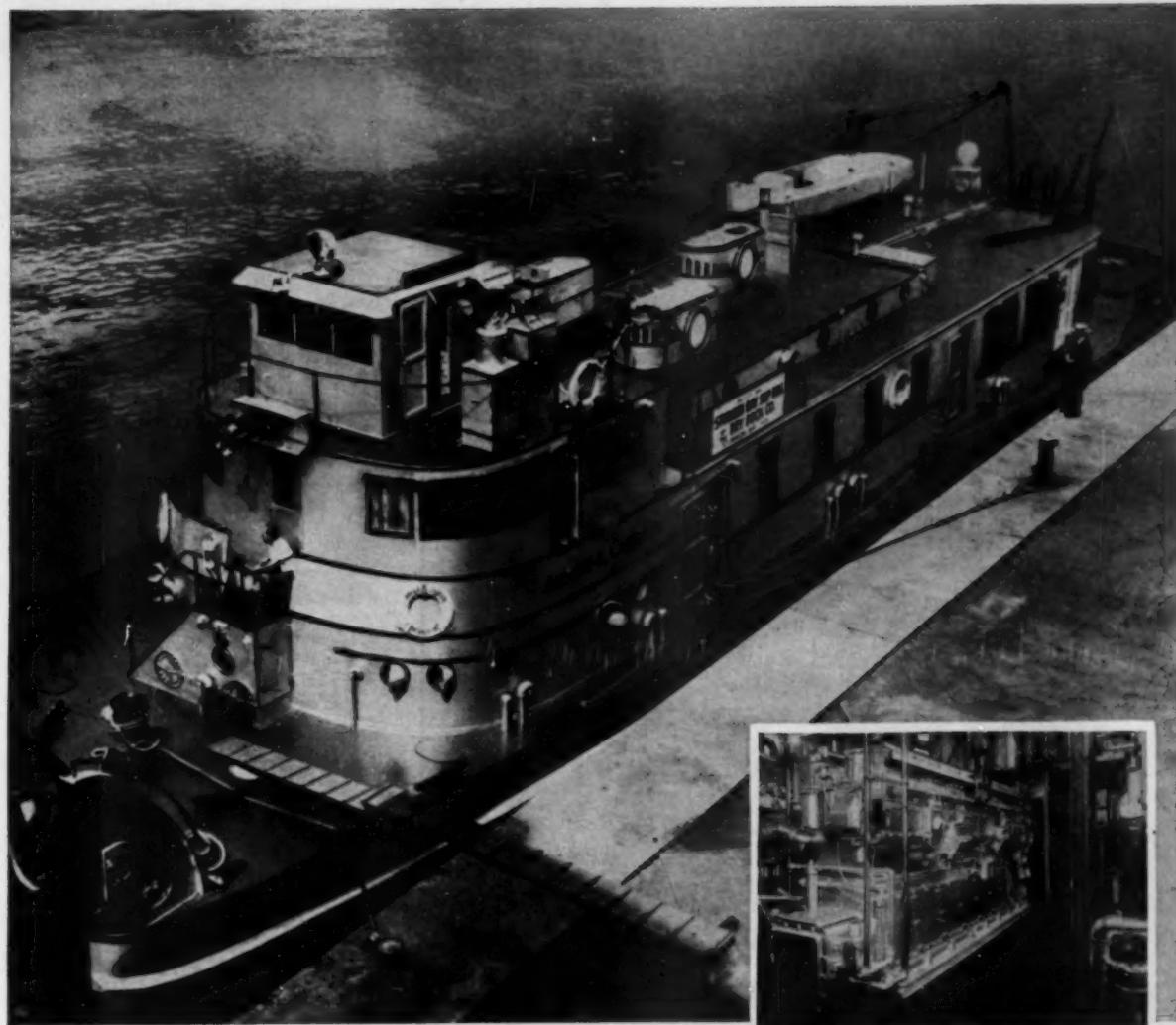
**Greater Safety • Lower Operating Costs  
Long Term Satisfaction • Increased Profits**

\*DIESEL ENGINES  
DUAL-FUEL ENGINES  
GENERATOR SETS  
HEAT EXCHANGERS  
ALARM SYSTEMS  
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## ALL SECURE...

**BELOW DECKS, too!** Fuel lines of triple Cooper-Bessemer diesel engines on Motor-tow "Anker L. Christy" are power-protected with D-86 WM Purolator<sup>®</sup> Filters. This means the complete fuel filtration essential because of close tolerances of injector tip orifices.

**PROTECTION like this** is becoming common practice with more and more diesel operators. Purolator

*Engine room of Motor-tow "Anker L. Christy."  
Built by Sturgeon Bay Shipbuilding and Drydock  
Company. Powered by triple Cooper-Bessemer diesel  
engines. Protected by Purolator filters.*

Filters have revolutionary accordion-pleated design elements which provide up to 10 times the filter area of ordinary units. Lube models trap abrasives as small as microns (.000039"); will neither warp, distort, nor disintegrate.

Whatever your filtering problem, let our Engineering Department help you solve it!

Reg. U.S. Pat. Off.

*Protect your Power with...*

**PUROLATOR**  
MICRONIC OIL FILTER

"FIRST IN THE FIELD OF FILTERING"

PUROLATOR PRODUCTS, INC. • Rahway, New Jersey and Toronto, Ontario, Canada • FACTORY BRANCH OFFICES: CHICAGO, DETROIT, LOS ANGELES

JUNE 1951

75

### Railroad Dieselization Accelerated

Diesels continue to take over the railroads. Reports of new diesel locomotive purchases keep coming in. The Union Pacific Railroad has ordered 44 diesel-electric freight locomotive units and switchers. The orders, together with 15 units now being delivered, represent an investment of over \$10 million dollars. The newest orders cover 30 freight units of 1,500 hp. each; eight 2,400 hp. yard switchers and six 1,600 hp. switching units.

The freight locomotives and yard switchers will be EMD and the six switchers will be built by Baldwin-Lima-Hamilton. The Pennsylvania Railroad also plans further dieselization. The system spent

about \$55 million last year for 214 diesel locomotives. This followed a \$38 million order the previous year. The Omaha division of the Missouri Pacific Railroad will be completely converted from steam to diesel by July 1st. This will be the sixth division of the railroad that has made the conversion. The Northern Pacific Railway has authorized equipment purchases totaling over \$11 million for 1952 delivery. The program includes 23 diesel locomotives which will supplement their present 27 units. The Lehigh Valley Railroad has received delivery of another 6,400 hp. diesel-electric road freight locomotive from the American Locomotive Company. This engine will replace two steam-type locomotives serving Buffalo-Niagara Falls and Jersey City.

### Texas District Manager



T. A. Nilsen

The De Laval Turbine Company of Trenton, N.J. has appointed Mr. T. A. Nilsen as district manager of a new Texas District Office recently opened in the Esperon Building, Houston. Mr. A. N. Sarich, for several years the De Laval Southwest technical representative in Oklahoma and Texas will continue in the same capacity with headquarters in the new Houston office.

### Expands Shop Facilities

Large shops for the inspection and repair of diesel-electric locomotives will be constructed by the New York Central at East Syracuse and East Buffalo, New York. Work on the shops, costing several million dollars, is expected to start late this summer. Steadily increasing dieselization of the railroad's local switching and through freight service requires construction of the new facilities for diesel maintenance. At both points, such work is done in sections of the local steam engine-houses. Both shops will be built in a modern design, using structural steel, with provisions for future expansion if necessary. Each will be at a point central to the locomotives they will maintain. The East Syracuse shop, to be constructed near an existing fueling and sanding station at DeWitt Yard, will have three through tracks with servicing platforms, each capable of accommodating a four-unit locomotive; two drop pits; and one release track with crane service. A washing machine for locomotives also will be installed beside an outside track. It is expected that this diesel shop ultimately will maintain, between general overhauls, approximately 195 road freight units, 46 road switching locomotives and 65 yard switchers. The new East Buffalo shop will be located at the railroad's Sycamore Street "Y." It will be equipped with a drop pit under four tracks; a drop table for changing engine trucks; cranes and other equipment. Some 145 yard switchers and road switchers will be maintained there eventually. These will be diesels assigned to Buffalo, Black Rock, Suspension Bridge, Batavia and Rochester.

### Another Tug For J. & L. Steel

The St. Louis Shipbuilding & Steel Co. of St. Louis, Missouri has received an order from the Jones & Laughlin Steel Corporation of Pittsburgh for the construction of a twin-screw diesel towboat. This boat will have Kort nozzles and several other special design features worked out by engineers of the owner and St. Louis Ship to meet the requirements of the Aliquippa Works of J. & L. Main engines will be Model D-364 Caterpillar diesels of 215 hp. each at 1200 rpm. with Snow-Nabsted 3.9:1 reverse-reduction gears. This is the second towboat that St. Louis Ship is building for use in the Pittsburgh area, having announced that they are to build a boat for U. S. Steel Co. Counting these, St. Louis Ship will have built four towboats for Pittsburgh interests in the past two years.

An advertisement for Fulton Iron Works Company. The top half features a large, complex mechanical component, possibly a diesel engine, shown in a cutaway view. The bottom half contains text and a company name. The text includes:

PRECISION FINISHING

interchangeable parts—lower maintenance costs

Even the heaviest parts of every FULTON DIESEL are craftsman-machined to such close tolerances that they are completely interchangeable. Result:

- Smoother running—higher operating efficiency
- Greater fuel economy—less wear and tear
- Quick, easy replacement saves time and money

WHERE DEPENDABILITY COUNTS,  
YOU CAN COUNT ON FULTON

FULTON IRON WORKS COMPANY  
SAINT LOUIS 14, MISSOURI

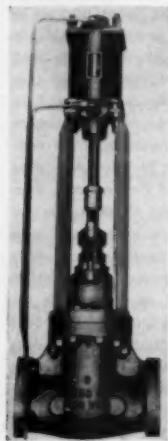
## Dallas Oil and Gas Power Meeting



Otto H. Fischer, President Union Diesel Engine Company and President of the Diesel Engine Manufacturers Association.

Mr. Otto H. Fischer will be the toast master at the annual banquet of the Oil and Gas Power Division of the American Society of Mechanical Engineers on the evening of June 27th at the Baker Hotel in Dallas, Texas. This important meeting starts bright and early on the morning of June 25th and runs through to that Friday, June 29th.

## Valve Actuators



Designed for the operation of gate valves, diaphragm valves, butterfly valves and sluice gates, and developed as a standard product, is a line of valve actuators, just introduced by Ledeen Manufacturing Company. The firm also builds a line of actuating cylinders for air, oil, water or steam operation, and a line of valves for actuating this type of cylinder. Ledeen valve actuators are basically Ledeen cylinders equipped with brackets, valves, controls and couplings to make them suitable for almost any type of operation required. They can be adapted to any make, size and type of valve; to operate against any line pressure; to work on any fluid medium and with any pressure available. They can be arranged for on-and-off service or for positioning service. For copies of Bulletin 512 showing typical valve actuator circuits and details of construction, application and control, write DIESEL PROGRESS, File 83, P.O. Box 8458, Cole Station, Los Angeles 46, California.

## Moves to Larger Quarters

Carl J. Nordstrom, widely known consulting naval architect, has moved to new and larger quarters in the Exchange Building, Seattle, Washington. The new offices accommodate a reception room, private conference room and ample drawing space to handle a larger volume of work than could be conveniently handled at the former quarters. This has been the second major move the firm has made since starting practice in Seattle in 1928. Each move has been into larger space under a continuing development that was only interrupted through 1941 to 1945 when Mr. Nordstrom was on active duty in the Navy.

## Film Offered By ABOE

A new motion picture film, "Power," that vividly portrays the development of power equipment down through the ages, has had its premiere showing to the press and company contacts recently. The film also brings into focus the origin, growth and activities of the Brush-ABOE Group of England, parent of ABOE, Inc., New York. Boworth Monck, executive vice president of the American company announced that the film is available for presentation to interested groups through application to the company or its distributors. "Power," a 16 mm. black-and-white production of 30 minutes running time, chronicles the historical development of power from ancient times.

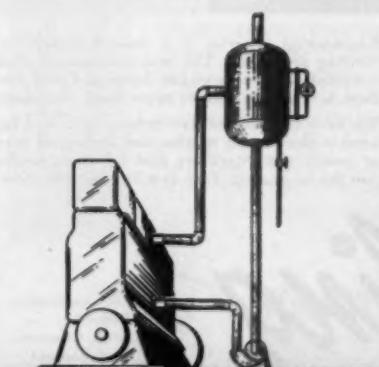


## VAPOR PHASE GIVES US AN "AIR CONDITIONING MIRACLE" and an Efficient Heating System, too!

Says J. H. Wally, Sr., President  
WESTERN BLUE PRINT CO., KANSAS CITY, MO.

"Since adding Vapor Phase, in July, 1949, to the two natural gas powered engines in our plant, we now have an amazingly efficient system that (1) furnishes electric power for the blue print and photocopy machines and for general lighting, (2) air conditions the building in summer with steam, (3) heats it in winter with waste engine heat via the air conditioning system, (4) heats water for the blue print machines, and (5) furnishes items 2, 3, and 4 for free!

"All this for an engine fuel bill of only \$480 a year and we SAVE better than \$1,200 annual heat and refrigeration costs. This saving more than paid for Vapor Phase installed."



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Offices in Most Principal Cities

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2835 East Eleventh St., Los Angeles 23

## Promoted

Stella R. Ellis has been promoted to chief chemist for Hunt-Spiller Manufacturing Corp., Boston, producer of diesel parts, Kenneth B. Hapgood, chief metallurgist, announced. Miss Ellis, a graduate of Boston University, joined the metallurgical department of the 141-year-old foundry in 1943 as a laboratory technician.

## Burgess-Manning Opens New Headquarters

The Burgess-Manning Co., manufacturers of industrial noise abating equipment, announced the opening of engineering and sales facilities at 1205

Dragon Street, Dallas, Texas, to serve the petroleum and chemical industries. Over-all charge of the Burgess-Manning manufacturing facilities, sales office and research laboratories at Dallas is in the hands of R. L. Leadbetter, vice president of the concern. S. G. Paddock is manager of sales and A. P. Gallagher is assistant engineer. A recently created architectural products division of the company for the new Burgess-Manning Radiant Ceiling and Acousti-Booths has been set up in Chicago, under direction of Dudley W. Day, vice president.

## Joins Experiment Station

The staff of the Engineering Experiment Station received a valuable addition by the appointment

of Dr. A. W. Hussman as Professor of Engineering Research, to assist Dr. P. H. Schweizer in diesel engine and military research projects. Dr. Hussman is one of the German scientists brought over in 1946 by the U. S. Air Force from Germany and has spent one year with the Air Materiel Command at Wright Field. Subsequently, he became Special Lecturer in Diesel Engineering at North Carolina State College prior to his present appointment.

Dr. Hussman, who is 44 years old, had a distinguished engineering career. He studied at the Institute of Technology of Berlin where he received his Dr. Eng. degree in 1938. From 1932 to 1945 he was Research Engineer at the German Aircraft Research Institute (DVL), Chief Engineer of Bayerische Motoren Werke (BMW), and later of Klockner-Humboldt-Deutz (KHD), both prominent German aircraft engine concerns in charge of mechanics, measurements, and testing materials. He is author of a book on "Harmonic Analysis and Synthesis" and numerous scientific papers on valve springs, torsional vibrations of engine crankshafts, and on the Comprex, a special type of pressure exchanger for gas turbines. Dr. Hussman is married and has two children.

## Moves To New Building



West Coast Engine and Equipment Company, distributors of General Motors Diesel Engines to the industrial, marine and petroleum fields in northern California, increased their sales and service facilities recently when they moved into their newly completed building in Albany, California. The new building is located on Eastshore Highway approximately one mile from the company's former headquarters in Berkeley. According to M. C. Wright, president of the company, floor space will be increased to over 15,000 sq. ft. and their new facilities includes a glassed-in display room, enlarged parts department and assembly areas. Future expansion is guaranteed by 30,000 sq. ft. of additional ground space available for building. The company was established in 1947 and received national recognition for outstanding sales and service achievements recently when Thurston B. Perry, sales engineer, representing the company, qualified for Detroit Diesel Engine Division's annual W. T. Crowe Award.

POWER to move ships and trains, to operate machinery or to light airports, means much more than merely installing an engine.

Fifty years of experience...broad and successful experience in applying power to just about every conceivable use is one of the reasons why Sterling engines are held in such high regard the world over.

Engineering progress is a second reason for Sterling preference. The best evidence of what constitutes success in engine design and performance is when customers come back for more.

We have the present day orders, facts and figures to show every marine and industrial user of power that Sterling's first 50 years marks just the beginning. *Talk to a Sterling Engineer.*

- Depend upon Sterling Diesel Power for Locomotives, Generator Sets, Commercial and Fishing Craft, Lift Bridges, Ventilating Systems, Drilling Rigs, Etc.



STERLING ENGINE COMPANY • 1270 Niagara Street • Telephone Lincoln 0382 • Buffalo 13, New York

# Sterling

MARINE AND INDUSTRIAL  
ENGINES

## Foreign Steel Purchased

Steel from mills in Belgium and Germany is scheduled for use in maintaining the present high level of production of Cummins diesels at Cummins Engine Company, Inc., Columbus, Ohio. Company officials revealed the arrival of an initial Belgian steel shipment of 136,000 pounds at New York. This steel is being reshipped to forging plants in Lansing, Michigan, and Indianapolis.

Indiana, where rough forgings are to be made, after which these parts will be finish machined at the Cummins factory. The Belgian shipment is a part of orders placed in European mills by two Cummins representatives during a recent six-week trip for various types of forging steel and about 75 miles of precision thin wall steel tubing. Cummins officials pointed out that these European purchases were made only after it became evident that its U. S. steel mill sources would not be able to supply its current total requirements for certain types of high quality steel.

The present expanding demand for its engines surpasses any period in the company's 32-year history, and the continuously accelerating needs for diesels to be used in equipment related to the nation's mobilization have pushed Cummins steel and other metal requirements to an unprecedented level. Cummins officials further explained that, even though capacity production at the Columbus factory has increased more than 60 per cent since World War II, incoming orders for Cummins diesels still exceed shipments. Acting to insure maintenance of the firm's present peak manufacturing schedule, Cummins sent its supervisor of purchasing, K. S. Shaw, and its chief metallurgist, H. H. Lurie, to Europe on a buying trip last year.

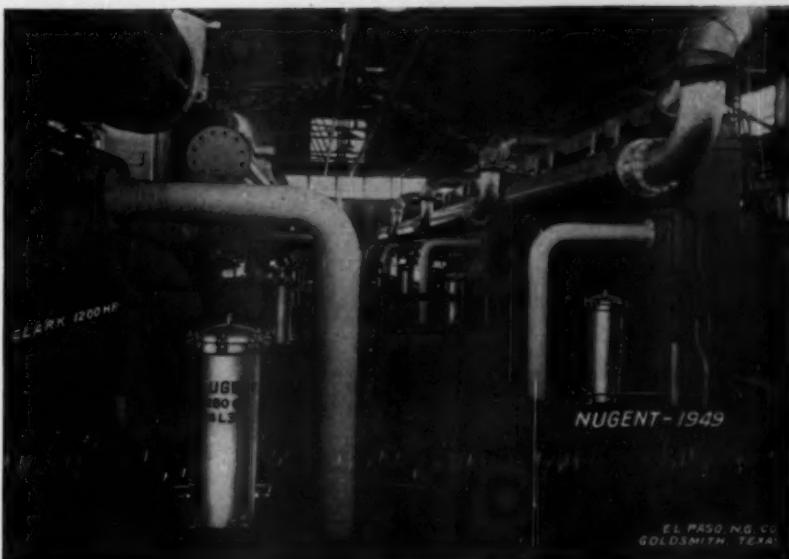
The steel buying representatives visited and inspected mills in France, Belgium, Norway and Germany, seeking the following types of steel: low carbon, electric furnace carbon, aircraft quality carbon, low alloy, high chrome, and high quality nickel stainless steel, as well as the thin steel wall precision tubing. Orders were given and the first shipment of low alloy and carbon steel by Belgian mills left Antwerp, Belgium, for New York on February 9th. Orders were placed for approximately 85 per cent of the total steel originally sought from European sources. Cummins officials were optimistic about the delivery and quality of European steel. Future orders, however, will depend on the ability to obtain complete steel requirements in the U. S. and the quality and delivery schedules of European steel.

#### Course For Diesel Plant Operators

The Division of University Extension and the College of Engineering of the University of Illinois in cooperation with the Illinois Public Power Association has conducted a three day short course for diesel power plant engineers, May 14, 15 and 16, 1951 at Robert Allerton Park, Monticello, Illinois. This park is a branch of the University of Illinois located approximately 25 miles southwest of its Urbana campus and four miles from Monticello, which is located on the main line of the Wabash Railroad between Chicago and St. Louis. The short course covered such topics as combustion, lubrication, fuels, governors, dual-fuel engines-operation-maintenance-supercharging, scavenging, scavenging and fire and accident prevention.



## Clean oil means longer compressor life



## with NUGENT ABSORBENT OIL FILTERS



Nugent Absorbent Oil Filters get out more of the harmful impurities that get into oil—99.8% by actual test and cleaner oil means that engines, compressors and all machinery will last longer and require less maintenance, while at the same time require less frequent replacement of oil.

Fig. 1280CP, the Nugent Filter type shown above installed on engine-compressor units at the Goldsmith, Texas, station of the El Paso Natural Gas Company, is typical of Nugent depth type pressure liquid filters. The filtering material generally used is a superior quality of cotton waste, wool, excelsior, asbestos or cellulose. No chemicals, bleaches or filtering earths are used. All units have very large capacity for their size. Fig. 1280CP is available in a wide range of capacities. Write for complete information.

Other Nugent filters are available to meet virtually every need.

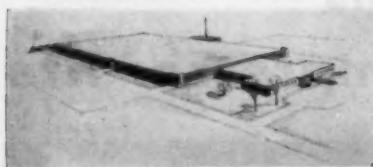


**Wm. W. Nugent & Co., Inc.**  
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Seattle • St. Louis • Tulsa • Representatives in Canada: Montreal • Toronto • Vancouver

### New Diesel Plant



Construction will start soon on a new factory and office building in Crystal Lake, Illinois, to house the diesel division of Harnischfeger Corporation, it has been announced by Mr. Henry Harnischfeger, vice-president of the Milwaukee firm. The factory, along with a smaller office structure, will occupy approximately 100,000 square feet on an 80-acre

site on South Main Street. Production of diesel engines is slated to start October 1st. About 200 production workers will be employed at the beginning. Operations will start with two shifts in the machining department and one in final assembly. Eventually it is expected that between 300 and 400 workers will be needed.

Once under way, the plant will produce models ranging from one to six cylinders in size. Plant capacity will provide for a total of between 1200 to 1500 hp. every working day. This equals 10 six cylinder engines per day or one every 45 minutes. The main office of the diesel division will be established at Crystal Lake. Karl Schoepfner, who was appointed eight years ago to develop the

diesel program for Harnischfeger, is general manager. He will continue in charge of the present diesel plant at Port Washington, Wisconsin. Plans call for continuing this facility for assembling specialized diesel equipment such as power units and marine engines as well as for warehousing. These operations, it is expected, will call for even more manpower than the division now employs there. The new Crystal Lake plant will be the eighth for this sixty-seven-year-old company manufacturing a long list of heavy machinery and equipment, including power shovels, truck cranes, excavators, overhead cranes and hoists, soil stabilizers and welding equipment.

### Caterpillar Promotions



J. J. Simko

Waldo J. Mordini

Promotion of Waldo J. Mordini to the position of engine sales supervisor for Caterpillar Tractor Co.'s western sales division has been announced by B. L. Hagglund, the company's western sales manager. Mr. Mordini, who headquarters at San Leandro, California, attended Virginia, Minnesota Junior College, University of Minnesota and General Motors Technical Institute, graduating with a degree in industrial engineering. He had a background of road construction work and service with Bendix Aviation Corporation and the Seabees when he joined Caterpillar in 1946. His experience in service, sales engineering and sales with Caterpillar have qualified him for his new position in the west. J. J. Simko, for the past six years in charge of western division engine sales, has been promoted to assistant manager, sales engineering division of Caterpillar Tractor Co., with headquarters at Peoria, Illinois.

### Rise In German Diesel Tractor Production

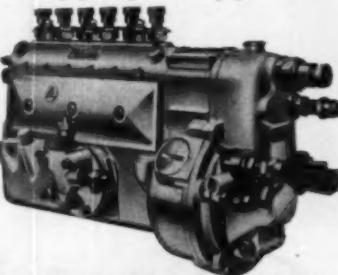
Figures released by the Kloeckner-Humboldt-Deutz plant in Cologne, Germany, reveals a tremendous increase on the production of dieselized tractors. In 1947, the company started with a monthly output of 56 units. It is now turning out 800 Duetz tractors a month. For the 1951-52 business year, the director of the Cologne-Kalk plant stated that about 16,000 tractors are being scheduled. Measures to bring about a further increase in production have already been gotten under way. This was the first German firm to develop a diesel tractor in preference to a gasoline powered unit. Recently, it has concentrated on the production of an air cooled diesel tractor. Last year, production got under way on the unit with a 15 hp. air cooled one cylinder diesel and the universal tractor with a 28 hp. air cooled two cylinder model. It is anticipated that other types of air cooled diesels will be introduced to the market in the near future according to the director.



*Transport operators all over the world have learnt to trust this sign.*

In any language the letters on the C.A.V. sign stand for first-rate service facilities, maintained by highly-trained craftsmen, using special precision equipment.

Wherever vehicles fitted with C.A.V. Fuel Injection Equipment are exported — whether to Trondheim, Santiago, Hong-Kong or Sydney — there's a service agent or depot to give it the specialist attention needed for such high-precision equipment.



### Fuel Injection and Electrical Equipment

*Service Depots throughout the World*

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## D.E.M.A. Sponsors Washington Meeting

Over eighty-five officials and representatives of engine, parts and accessory manufacturers from all sections of the country turned out in Washington April 26 to learn how better to serve the defense program. The meeting which started with breakfast at 8 A.M. and closed with a question and answer period in the afternoon, was addressed by representatives of the Machinery & Allied Products Institute, The National Association of Manufacturers, The National Production Authority and The Office of Price Stabilization. Principal speaker at the noon luncheon was Walter Chamblin, Washington Representative of N.A.M.

Subjects covered in the formal part of the program were: How The Defense Program is Operating; Renegotiation; Tax Amortization and Certificates of Necessity; Controlled Materials Plan; Getting Critical Materials Now; How Small Business Should Go About Getting Results in Washington; Price Ceilings and Happenings in Washington Affecting Business. Credit goes to D.E.M.A. for organizing a helpful, informative meeting.

## Shipped to Oregon



A standard GE diesel electric shown being loaded aboard a flat-car at the General Electric Company's Erie, Pa., plant, is being shipped to the C. D. Johnson Lumber Corporation at Toledo, Oregon. Because of a tunnel on the branch line to Toledo, the locomotive will have to be unloaded by railroad cranes at Eugene, Oregon and hauled the last 118 miles to Toledo on its own wheels at a speed of 25 miles per hour. The new GE 45 ton diesel-electric locomotive will be used on the company's lumber operations on the Pacific slope of the coast range and will replace a steam locomotive.



## IS WASTE HEAT WASTING YOUR MONEY?



### MAXIM HEAT RECOVERY SILENCERS CONVERT WASTE EXHAUST HEAT TO USABLE STEAM or HOT WATER

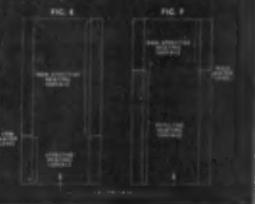
A big Los Angeles Sewage Disposal Plant found that Maxim Heat Recovery Silencers provided all the steam necessary for plant heating as well as heating the sludge — and from exhaust heat that would otherwise have been wasted.

Perhaps your own operating expense picture can be improved by this simple and effective way to provide extra steam or hot water for heating or processing operations while at the same time effectively silencing exhaust noise. Our engineering department will be glad to make recommendations.

#### Automatic Controls

In Figure E water is low and there is less effective heating surface (heating surface in contact with water), hence lower steaming rate.

In Figure F water is high and gives greater effective heating surface — higher steaming rate. Steam pressure regulated valves control the amount of water to produce desired steam capacity.



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Gentlemen: Please send me your Bulletin on Heat Recovery Silencers



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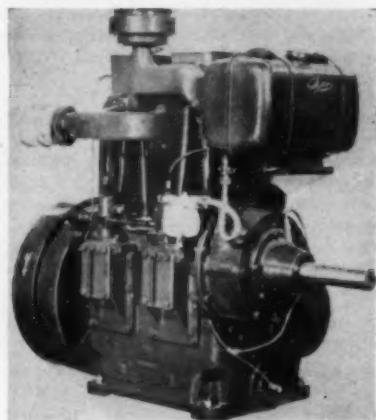
### Big Diesel Purchase Authorized

President John D. Farrington of the Rock Island Railroad has announced that his board of directors has authorized him to buy more than \$7 million of new diesel equipment. The move is another in a series designed to completely dieselize the road within two years. The big order, to be placed by Mr. Farrington, includes six 2,250 horsepower road passenger diesels, fifteen 1,500 horsepower double-control suburban diesels, and twenty-five 1,500 horsepower general purpose diesels. The authority granted was for the purpose of expediting the dieselization program and greatly increasing the number originally intended to enable the railroad

to meet in every respect the requirements of the present defense program. Upon the delivery of these engines and the others previously ordered for 1951, the railroad will be approximately 100 per cent dieselized and should be the first major line of comparable operations to complete 100 per cent conversion. Mr. Farrington added that the additional power would place the road in a position to meet almost any demand which might be made upon it as a result of the national defense program.

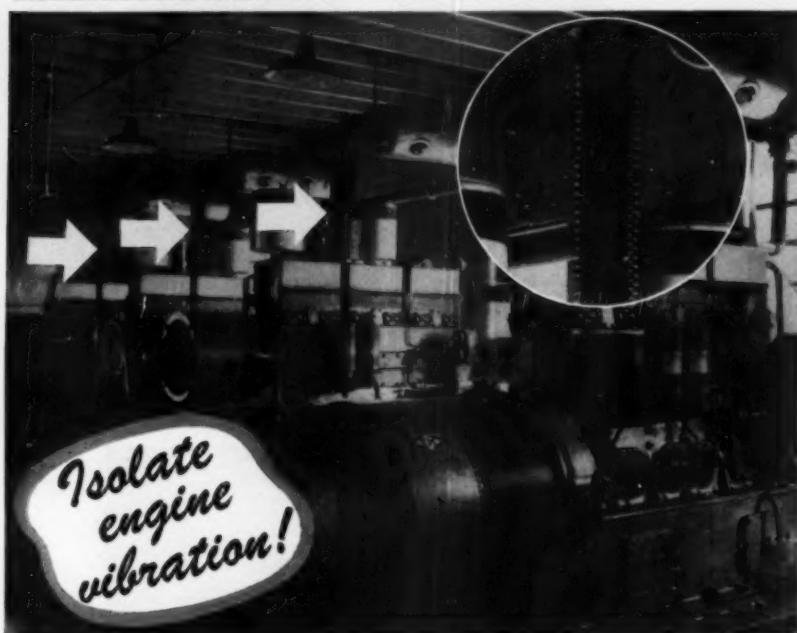
stated that the railroad's growing use of diesel-electric locomotives is contributing substantially to lower operating costs. The railroad's ownership of diesel power increased from three units in 1938 to 424 at the end of 1950. The road's charges for locomotive repair and fuel costs were down \$1,300,000 last year from expenditures in 1949 because of increasing use of diesel power.

### Air-Cooled Engine Added To Line



ABOE, Inc. have added an air-cooled version of the Petter AV water-cooled engine to their range of small diesels. The new Petter development is known as the AVA and is available in either a single or two-cylinder unit, developing a continuous hp. of 5.25 and 10.5 at 1800 rpm, respectively. The bore and stroke of the AVA is identical to the AV water-cooled model; 3.15 inches x 4.33 inches per cylinder. The weight of the AVA single engine is 390 lbs., while the two-cylinder engine is only 550 lbs. The design is simple as well as rugged and embodies a number of interesting new features. Full pressure lubrication provided by a reciprocating pump is supplied to all main and large-end bearings. The main and large-end bearings are the thin-shell precision steel-backed type lined with white metal except for the upper half of the large end which is copper-lead to withstand the increased loading. Other features are aluminum alloy pistons with three compression rings, fully floating wrist pin, a hemispherical combustion bowl and a cylinder barrel of one piece centrifugal casting of special C.I. alloy and heavily finned to provide adequate cooling.

Individual fuel injection pumps operated by a common camshaft provide fuel under high pressure to a closed type of multi-hole nozzle. The nozzle breaking pressure 2,500 lbs. psi. One of the problems which has confronted the designer of air-cooled diesels has been the lack of adequate cooling of the injector nozzle. Petters has solved this problem by inserting an aluminum finned sheath between the head and nozzle body. An interesting feature of these two new engines is the fact that a large proportion of the parts are interchangeable with the AV water-cooled models. Among the extras available with the air-cooled engines is a multi-plate clutch that can be mounted either on the full-speed or half-speed power take-off. Autolite electric starting is optional equipment.



### with CMH FLEXIBLE CONNECTORS for INTERNAL COMBUSTION ENGINES



In new installations or existing ones, CMH all-metal flexible connectors will isolate engine vibration from fixed exhaust or air intake lines. They will also absorb expansion or contraction and correct for misalignment. Leak-tight and fatigue resistant, CMH flexible metal connectors give long, dependable, *maintenance-free* service.

Available in steel or stainless steel in sizes from 1" to 30" I.D. Standard assemblies are made with pipe nipples, couplings, fixed or floating flanges as required. Write for full details and specification sheets.

*The illustration above shows CMH Flexible Connectors installed in the exhaust lines of these diesel-electric generating sets.*

#### Other CMH Assemblies for Internal Combustion Engine Service

CMH REX-WELD Corrugated Flexible Metal Hose with or without metal braid covering is pressure and vacuum tight and serves as an ideal flexible connector for lines conveying fuel, air, water, oil, etc. Available in sizes from 3/16" to 4" I.D.

CMH FIRE PROOF Flexible Metal Hose is available for installation where the ultimate in fire protection is required. Sizes 5/16" to 8" I.D.

*Write for descriptive literature.*

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**ONE DEPENDABLE SOURCE**  
for every flexible metal hose requirement

## Adds To Diesel Tug Fleet

Awarding of a contract for a new tug to help speed deliveries of gasoline, fuel oil and other petroleum products in the New York metropolitan area has been revealed by the Socony-Vacuum Oil Company, Inc. In addition to many improvements over tugs currently in use, the new vessel also will have 33 percent more horsepower than others in the Socony-Vacuum fleet. At present, the company operates two steam and three diesel tugs for barge deliveries of petroleum products and to assist incoming and outgoing tankers in New York harbor. *Socony II*, as the new tug has been named, will be sixth in the tug fleet. The craft is being built at the Avondale Marine Ways, Inc., at New Orleans and delivery is scheduled in October.

It will have an overall length of 102 feet six inches, a beam of 25 feet and a molded depth of 12 feet, 11 inches and a draft of nine and three-quarters feet forward and 11 feet aft. Of single screw design, the tug will be powered with a 1600 horsepower GM diesel capable of turning the propeller shaft at 215 rpm. through reduction gears. Two 30 kw. auxiliary diesel generators will supply the vessel's needs for electricity. Sleeping accommodations for a crew of 12 will be provided, including separate quarters for the captain, chief engineer and assistant chief engineer. An unusual feature of the tug will be an inside passage way transversely across the ship to provide access to the pilot house, store-room, engine room, galley and crew quarters without need for using the outside decks in rough or stormy weather. Other features include a deep-freeze locker for food and a radio-telephone circuit for ship-to-shore communication.

### Assistant Manager

O. O. Lewis, vice-president in charge of sales, Fairbanks, Morse & Co., Chicago manufacturers, has announced the appointment of S. W. Hickey as assistant manager of the Railroad Products Department.

"Wayne," as he is known by his many friends and business associates in the railroad industry, has for the past eighteen years, been associated with the Simmons-Boardman Publishing Corporation and for the past year was sales manager of that company. Previous to his association with that organization, Mr. Hickey had considerable experience in actual railroad service. He is a member of the Western Railway Club and Maintenance of Way Club. His headquarters will be at 600 South Michigan Avenue, Chicago, in the Fairbanks-Morse Building.



S. W. Hickey



# Trouble ahead?

## TELLITE TELLS!

Operators often forget to check engine gauges. Result: bearings burn out, engines heat up, generator systems fail, etc. And your reputation for building dependably performing engines (or operating them) starts down the hill. It's not your fault, but what can you do?

Plenty—you can install Rochester TELLITE Visual Warning Systems. New, unique TELLITE gives operators a virtual fool-proof warning when trouble begins—before damage is done. A pilot light glows steadily under normal conditions. But when something happens—Wham! . . . That light starts flashing brilliantly.

TELLITE gives the initial warning of trouble ahead. ROCHESTER GAUGES accurately and dependably indicate where the trouble lies—before it's too late. Whatever your instrument problem, the chances are a standard ROCHESTER gauge can handle it. Write ROCHESTER MANUFACTURING COMPANY, 101 Rockwood Street, Rochester 10, New York.

**ROCHESTER**  
MANUFACTURING COMPANY, INC.

DIAL THERMOMETERS GAUGES AMMETERS



## New Company Organized

The organization of Machinery, Inc. located at 919 Virginia St. E., Charleston, W. Va., has been announced. The company will cater to the needs of the contractors, timberman, manufacturer and others in the construction-industrial field and will specialize in the sale, rental, and service of heavy construction equipment and supplies. Officers will be: O. W. Robinson, president, now associated with the West Virginia Mine Supply Co., Clarksburg, W. Va.; W. T. Coleman, vice-president and general manager, formerly with Baldwin Machinery Co., Charleston, W. Va.; C. K. Payne, secretary and treasurer, owner Engine Sales & Service Co., Inc., Charleston, W. Va. The board of directors

includes James S. Rodney, E. W. Allen, M. K. Gaines, Preston A. Young and Henry P. Butts.

## Acquires Austin-Western Company

Marvin W. Smith, president, announced that Baldwin-Lima-Hamilton Corporation has acquired all the outstanding shares of common stock (303,945 shares) of Austin-Western Company in exchange for 486,312 shares of common stock of Baldwin-Lima-Hamilton Corporation on the basis of 1.6 shares of Baldwin-Lima Hamilton common for each share of Austin-Western common. Approval by the board of directors of Baldwin of the proposed plan of acquisition was revealed late last year. Mr. Smith stated that the present offices and

personnel of Austin-Western Company will remain unchanged and that the present officers will continue to direct Austin-Western's operations, including manufacturing, sales and engineering. Increased demands for the company's products will be met by utilizing the facilities of other Baldwin-Lima-Hamilton plants, thus allowing Austin-Western to concentrate on road graders and hydraulic cranes at its Aurora, Illinois plant.

## New Cleveland Sales and Service Branch



Another new sales and service office, their sixth completed thus far in their present plan of expansion, has recently been completed by Fairbanks, Morse & Co., Chicago manufacturers. This is the new building housing the Cleveland, Ohio, sales and service branch of the company located on the West side of Cleveland at 3000 West 117th Street. The new structure, with an area of about 30,000 square feet, represents an investment of approximately \$300,000. The building is of the latest modern design and includes not only the Cleveland branch office, but also a modern diesel repair shop, completely equipped scale shop for repairing and rebuilding scales, large warehouse, repair parts department and display floor. Harry E. Brown who has been with Fairbanks, Morse & Co. for more than a quarter of a century, is manager. Among those present at the dedication were Robert H. Morse, Jr., president; L. W. Stolte, vice president and treasurer and O. O. Lewis, vice president—sales.

## Improvements Incorporated

R. G. LeTourneau, Inc., Peoria, Illinois, manufacturer of heavy earthmoving equipment is now building the Super C Tournadozer available with torque converter and electric control. The torque converter is a single stage type, which acts as an automatic hydraulic transmission, combining the advantages of a hydraulic torque converter and a hydraulic coupling. The various gears in the constant-mesh, air-actuated transmission are now controlled by electro-magnetic valves placed in the air lines going to the clutches which engage the transmission gears. These valves are controlled by 4 push-pull finger tip switches mounted on the dash panel. The air-actuated transmission gear changes into higher or lower ratios instantaneously, thereby eliminating loss of momentum. Electrically controlled steering gear is accomplished by the use of a toggle switch on the control panel. The Tournadozer is turned by pushing the toggle switch in the desired direction to actuate synchronized electro-magnetic valves in the air lines controlling the clutch and brake discs.

# CONTROL POWER BETTER

A circular graphic containing several small illustrations of mechanical parts like gears and bearings. In the center, the text reads: "7 out of 10 Leading Road Grader Manufacturers Use ROCKFORD CLUTCHES". Below this, in smaller text, it says: "To insure reliable service under the difficult working conditions met in road building work." At the bottom of the circle, there is a small box containing text and a small illustration of a clutch assembly.

ROCKFORD CLUTCH DIVISION  
BORG-WARNER  
1321 Eighteenth Street, Rockford, Illinois

# ROCKFORD CLUTCHES

## Appoints Factory Representatives



C. B. Foster



John W. Post

The appointment of two experienced Cummins sales executives as factory representatives to governmental agencies has been announced by L. W. Beck, vice-president-sales of Cummins Engine Company, Inc. at Columbus, Indiana. C. B. Foster will head a new department of the Sales Division as manager, contract sales. John W. Post has been named regional manager of the newly created Washington, D. C. region. Company officials indicate that this move will result in closer coordination of the factory's activities to the accelerating demand for the company's diesels by the nation's mobilization program. Until recently Mr. Foster was Cummins' national accounts representatives with offices in Chicago. He will now divide his time between Columbus, Chicago and Washington, D. C., on direct government contract work and also assist in liaison with all other Cummins departments on indirect government sales. Mr. Post has been the Cummins Washington representative. As regional manager, he will continue to work directly with government contacts. Plans also call for his supervising an increased staff of representatives in the Washington office which the company has maintained for many years.

## Deceased

Frank L. Orr, vice president and sales manager for the Maxim Silencer Company of Hartford, Connecticut, died in Washington, D. C. on April 15 while on a business trip. Mr. Orr was born December 15, 1894 in Saunderstown, Rhode Island. In World War I, he served as an ensign in the destroyer service. He was a mining engineer in Colorado for a time after the war. Later, he was with the diesel engine division of Fairbanks, Morse & Company and, in November 1930, joined the Maxim Silencer Company. Mr. Orr was a Mason and a member of the American Society of Naval Architects and Marine Engineers. He leaves his wife, Mrs. Edith Pringle Orr, and a daughter, Miss Marion Orr of New York City.

## Oil Purification Information



Important, up-to-date information on oil purification for hydraulic equipment, metal-working machines, gas and diesel engines, turbines, transformers, etc., is now available in a new 16-page booklet entitled "The Facts About Clean Oil." Prepared by the Honan-

Crane Corporation, Lebanon, Indiana, the booklet answers the questions about oil purification and shows the correct method and equipment to stop downtime, cut down rejects, improve and increase plant production. It describes with the use of actual case histories, how many major plants all over the country have realized substantial savings in oil consumption and equipment operating and maintenance costs since installation of Honan-Crane oil purification equipment. Wide selection of plant photographs serve to illustrate applications of Honan-Crane equipment to a variety of purification operations. This interesting and useful booklet can be obtained from the Honan-Crane Corporation, 202 Indianapolis Ave., Lebanon, Indiana.

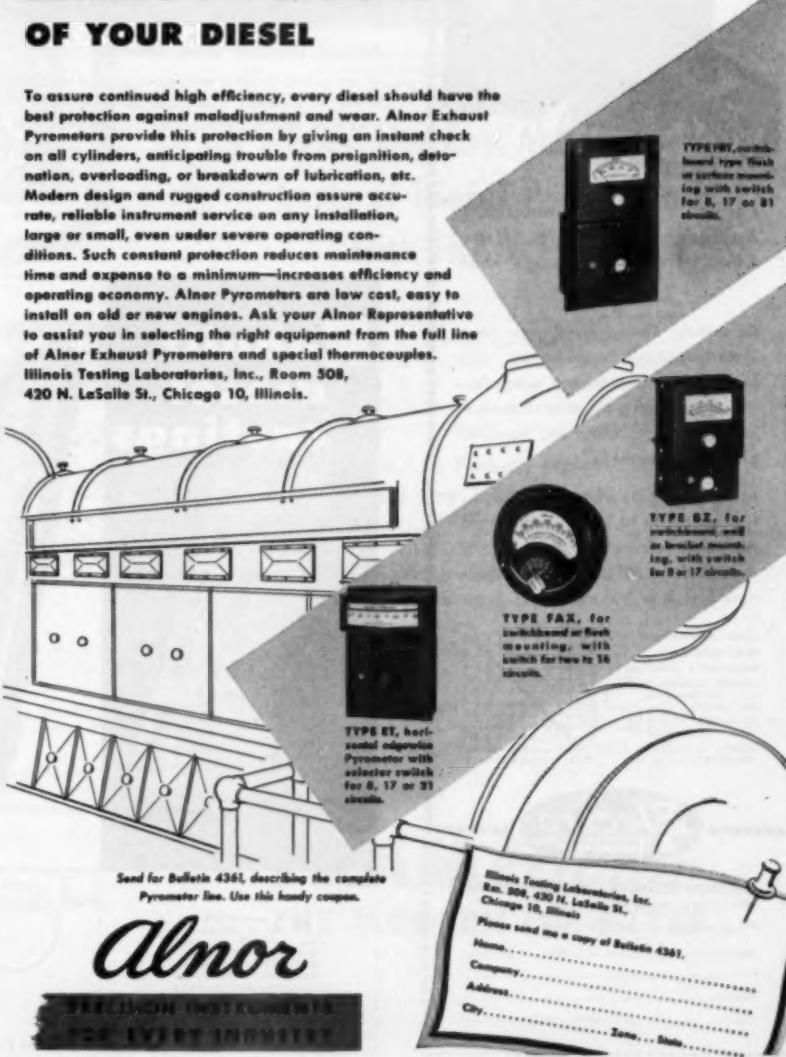
## Twin Screw Diesel Towboat

The United States Steel Co. of Pittsburgh, Pa. has awarded a contract to the St. Louis Shipbuilding & Steel Co. of St. Louis, Mo. for the construction of a 1280 hp. twin screw diesel towboat. Main propulsion will be furnished by two Fairbanks-Morse 38D8½ four cylinder opposed piston, non-reversing diesels developing 640 hp. each at 720 rpm. A Universal Gear Model R7-30 marine reverse and reduction gear will reduce shaft speed to 260 rpm. This is the second towboat the St. Louis firm has constructed for the steel company. The C.I.S. 6, a diesel electric harbor boat was built in 1919. The new boat will be equipped with Kort Nozzles.

# Alnor Protection

## EXTENDS THE LIFE LINE OF YOUR DIESEL

To assure continued high efficiency, every diesel should have the best protection against maladjustment and wear. Alnor Exhaust Pyrometers provide this protection by giving an instant check on all cylinders, anticipating trouble from preignition, detonation, overloading, or breakdown of lubrication, etc. Modern design and rugged construction assure accurate, reliable instrument service on any installation, large or small, even under severe operating conditions. Such constant protection reduces maintenance time and expense to a minimum—increases efficiency and operating economy. Alnor Pyrometers are low cost, easy to install on old or new engines. Ask your Alnor Representative to assist you in selecting the right equipment from the full line of Alnor Exhaust Pyrometers and special thermocouples. Illinois Testing Laboratories, Inc., Room 508, 420 N. LaSalle St., Chicago 10, Illinois.



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with the NEW  
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EXPLOSION, GAS or  
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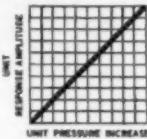


**For Jet or Internal Combustion  
Engines, Compressors, Pipe  
Lines, Injection Pumps and  
Explosions**

**Completely Re-Engineered**, the new Linear Stabilized Pressuregraph now provides greater accuracy in measuring and recording pressure-time studies of dynamic, static and transient pressure phenomena.

In addition to its wide range (from a few ounces to 10,000 PSI) and broad frequency response (static or zero to over 20,000 CPS) it now offers these new exclusive features:

Linear measurement  
Drift stabilized  
Temperature stabilized  
200,000 separate pressure measurements per second  
Up to 200' of pick-up cable can be used  
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**Annual General Sales Meeting**

At the annual general sales meeting held recently, Stewart & Stevenson sales and factory representatives from branches throughout Texas gathered in Houston for an all-day session and inspection of expanded plant facilities at the company sales and manufacturing headquarters. Joe Manning, vice-president and general manager of Stewart & Stevenson Services, conducted the meeting. In at-

tendance, (pictured above), left to right, standing: Benny Miller, Fred Malley, Bob Hardy, Bob McMullen, Emmett Dobbs, Harvey Trotter, Paul Driver, Bill Collett, Jim Brown, King Boyd, Bill Foster, Tiny Herman, Slim Childress, Tommy Langham, W. L. Rutledge, Lee Howell, Harold Speers, N. N. Elkins; seated, Dick Grant, Dick Conolly, Mr. Manning, D. D. Chene and Loy Leffingwell.

## Rebuilt diesel castings... with the **Guth FUSION® PROCESS**



Save yourself costly shutdowns. Save the expense of new castings. Send broken diesel heads, blocks, and castings to Guth for renewal by the Guth fusion process backed by 25 years of successful experience. Ask any Guth user or send today for illustrated catalog.

Dealerships available, write today for complete information.

\* A specialized system of reconstructing damaged or worn castings to new or better-than-new condition conforming with latest factory specifications . . . fully guaranteed.



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DIESEL PROGRESS

**ATLANTIC METAL HOSE  
GUARDS  
DIESEL LIFELINES**  
AIR-FUEL-WATER-EXHAUST

ATLANTIC flexible metal hose does a better job of transmitting vibration of reciprocating diesel and gasoline engines continuously, trouble-free operation—because each section is Job Tested and Guaranteed to Do Its Job!

That's why more and more purchase requisitions read, "Order from Atlantic for Every Diesel Need!" Fabricated in all workable metals— $\frac{1}{2}$ "—36" I.D. inclusive—... with fittings as desired.

Write for Diesel Bulletin 1020 and 30A • See our Catalogue "Flexible Hose for Products—Gasoline, Diesel, Fuel, Water, Air, Oil, Gas, Liquids, Chemicals, and Gases."

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IN THESE DAYS OF FAST MOVING PREPAREDNESS PROGRAMS AND ACCELERATED INDUSTRIAL PACES?

IT IS THE PURPOSE OF OUR BUSINESS TO RELIEVE YOU OF YOUR POWER PLANT MAINTENANCE AND REPAIR PROBLEMS, whether they be routine inspection and maintenance, minor repairs, modifications or complete rebuilding.

#### ANY PLACE—ANY TIME

MANUFACTURING and REPAIRING of heavy castings, crankshafts, bearings, connecting rods, pistons, liners, cylinder heads, valves, etc.

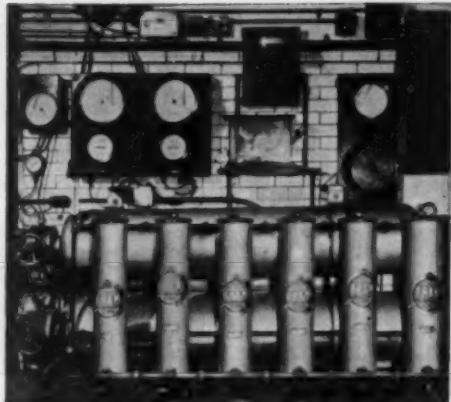
Obsolete parts and items no longer stocked by the engine builder need not keep your power plant equipment out of service.

Our complete line of especially engineered and developed portable machines and "On The Job" equipment may save you valuable time and expense.

CALL, WIRE or WRITE for further information.

SEEING PAGE WITH DIESEL PROGRESS

**WASHINGTON IRON WORKS, Inc.**  
Established 1876  
SHERMAN, TEXAS



These six FRAM Filters serve 840 h. p. Fried Krupp Diesel at large eastern university. This Diesel drives a 600 kw. Cracker-Wheeler generator.

## University Cuts Maintenance Costs of Diesel Power Plant with FRAM Filters

Four FRAM Filter installations filter dirt, grime, sludge and carbon from lubricating oil of 545 h.p., 630 h.p., 840 h.p. Fried Krupp and a 448 h.p. Baldwin in power house of large eastern university. Engineers consider FRAM Filters the best . . . definitely a money-saver. Absolutely no maintenance except changing cartridges.

#### FRAM Filcron Filters Do the Job Better!

- Remove solid and abrasive contaminants 1 micron (.000039") and larger
- Minimize Engine Wear
- Reduce Engine "Down-time"
- Extend Engine Life
- Lower Operating Costs

No matter what your Diesel oil filtering problem—either fuel or lube—Fram can help you conquer it. Write for full information today to FRAM CORPORATION, Providence 16, R. I. In Canada: J. C. Adams Co., Ltd., Toronto, Ontario.

**FRAM Filcron**  
THE MODERN OIL FILTER



# "Joe's O.K. He's one of us..."

What does he mean—"One of us"?

You know what he means. Joe spells his name right. His religion is right. His folks come from the right part of the world.

Yes, maybe Joe is O. K.

But the fellow who says "He's one of us"—that fellow isn't O. K. He's intolerant. Blind, unreasoning prejudice makes him think he's better than somebody else.

In your employ there may be some prejudiced folks like this. They may work for you . . . but they don't work *together with others* for you. Not very well they don't. And you ought to do something to show them

how wrong they are. You ought to do it for America's sake . . . for your own sake.

The Advertising Council is asking you to join hands with it in promoting *fair play* to all regardless of race, religion or national origin.

Display one of these posters in your office or your factory. Let men and women of good will know that there are other men and women of good will who believe as they do.

Help make yours a more friendly community in which more personal and direct methods may flourish and take root.

It will serve you while it serves America.

Post these  
messages in  
a public  
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Copies are  
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A non-profit organization representing all phases of advertising, dedicated to the use of advertising in public service.  
*Accept or reject people on their individual worth.*

The Tug "Rustler"



Ray Beaudry and Bill Egenhoff, owners, on the deck of the *Rustler*.

big V-type diesels to go into an Oregon vessel, an 8-cylinder, 5½-inch by 8-inch turning 1200 rpm., was purchased by Harbor Tug and Barge Company's co-owners, Ray Beaudry and Bill Egenhoff, from the Interstate Tractor and Equipment Company of Astoria who also made the installation.

The compact new engine swings a 55-inch Coolidge propeller through a Snow-Nabstett 3:1 reduction gear and a new 3½-inch monel propeller shaft installed with a 4-inch Goodrich Cutlass stern bearing and a stuffing box bearing. Efficient cooling is provided by a Walters Keel cooling system. A Maxim Silencer and flexible exhaust tubing control engine noise. The *Rustler* has a 13-ft. 9-inch beam and 4-ft. 6-inch draft. She is 48 feet long.

#### Arizona Distributor Appointed

Detroit Diesel Engine Division of General Motors has announced the appointment of O'Connell Brothers, Inc., 505 North Central Avenue, Phoenix, Arizona, as G.M. diesel engine distributors for the state of Arizona. Business will be carried on at the firm's present headquarters in Phoenix but plans for necessary expansion are under way according to Joe O'Connell, president and general manager. The new line includes 2, 3, 4 and 6 cylinder single diesel engine units and multiple engine units up to 24 cylinders in power ranges from 32 to 780 hp. The engines are of 2-cycle design. O'Connell Brothers, Inc., have been located in Phoenix since 1919 and have represented United Motors Service since 1925. Additional outlets are to be established at Flagstaff, Safford and Tucson.



JUNE 1951

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#### THE LEADER

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Lubrication

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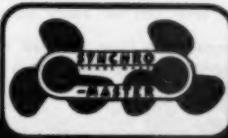
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Builders of HIGH PRESSURE METERING PUMPS Since 1898

# Get rid of the SHUDDERS

Shudders characteristic of twin and multiple screw boats can be greatly reduced by Synchro-Master which automatically controls the relative speeds (revs.) of all engines. Give us a chance to prove this, by writing for data and recommendations. Address inquiries to %Proportioneers, Inc.%, Synchro-Master Division, P. O. Box 1442, Providence 1, R. I.



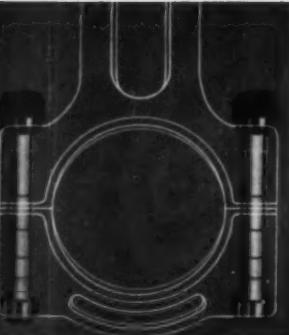
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SYNCHRO-MASTER DIVISION

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- ✓ Test Pump 1800 cu/mm capacity; ported design. Leak-proof—plunger is chrome steel, hardened, ground and lapped into pump body.
- ✓ Nozzle-holding Fixture has spring clamps that accommodate nozzles of different shank diameters. Nozzle is simply "snapped" into position between the clamps.
- ✓ Fuel Supply Reservoir (2.5 pint capacity) of durable, transparent plastic; fuel level can be easily observed.
- ✓ Micronic-type Filter is noted for its superior cleaning efficiency; is easily replaceable.

Get full particulars—Write for Leaflet 628.

BACHARACH INDUSTRIAL INSTRUMENT CO.  
7000 Bennett Street • Pittsburgh 8, Pa.

### Special Three-Day Meeting

Regional managers of Cummins Engine Company, Inc., at Columbus, Indiana, held a special three-day meeting recently at the Indianapolis Athletic Club in Indianapolis. L. W. Beck, vice-president in charge of sales, presided. The managers of nine Cummins regional liaison offices and factory sales executive personnel met to discuss the Cummins selling program. One of the most important topics was Cummins' role in the nation's mobilization program, which was outlined by Mr. Beck. R. E. Ruthsener, executive vice-president, addressed the group on the subject, "Problems in This Emergency Compared to World War II." W. M. Harrison, vice-president and treasurer, and P. M. Lovell, materials manager, also took part in the program. Mr. Harrison's subject was "Operating Under Price Regulation", and Mr. Lovell's topic was "Material Procurement Under Government Regulations."

In attendance at the three-day meeting were: C. J. Willhite, northwest regional manager, Seattle, Washington; A. S. Leonard, southwestern regional manager, Los Angeles, California; L. E. Williams, Rocky Mountain regional manager, Denver, Colorado; F. W. Hartmann, central regional manager, Chicago, Illinois; G. W. Stevens, mid-continent regional manager, Fort Worth, Texas; W. G. Turner, southeastern regional manager, Atlanta, Georgia; M. W. Brooks, Great Lakes regional manager, Cleveland, Ohio; W. N. Westland, eastern regional manager, New York City, New York; and J. W. Post, Washington, D. C., regional manager. Sales personnel from the Columbus plant included: L. W. Beck, vice-president—sales; C. R. Boll, manager—engine sales; R. D. Hicks, manager—parts sales; H. H. Hall, general service manager; P. J. Every, manager of regions; C. B. Foster, manager—contract sales; H. P. Sharp, manager of sales development and G. W. Glenn, vice-president and general manager of Cummins Diesel Export Corporation.

### New Standardaire Blower Bulletin

A six-page engineering bulletin, just issued, lists capacities and complete dimensions of Standardaire Blowers for supercharging diesel engines and many other applications. All dimensions are charted with reference to dimensional drawings so that pipe sizes may readily be selected. Isometric drawings illustrated the method of attaching accessories such as inlet filter-silencer, flexible coupling, expansion joint, relief valve, check valve, detachable drive pulley, drive motor, etc. Supplied in ready reference form are data on, Engineering Layout, Typical Applications, Model Numbers and Ratings in cfm. at various rpm's. Write for your copy of the "Standardaire Blower" bulletin to The Standard Stoker Company, Inc., 370 Lexington Avenue, New York 17, New York.

### Diesel Repair Shop Planned

Plans for a new diesel locomotive repair shop have been projected by the Milwaukee Road. Erection of the shop will permit separation of diesel repair and diesel servicing operations. The new building, 90-ft. by 200-ft., will be of structural steel and glass. Completion is scheduled for November.

# NICAD

MADE IN U.S.A.

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LONG-LIFE, LOW MAINTENANCE  
NICKEL CADMIUM BATTERIES  
for your  
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The above compact 32-volt, 204 A.H. NICAD installation, on a leading oil company barge, is replacing three 32-volt lead acid batteries that previously operated two oil pumping engines and the ship's lighting and electrical system. At least 20 hours of charging time is saved every week. Since installation of NICAD, additional electrical units have been added to ship's equipment without overload.

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100 Park Ave., New York 17, N.Y.

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JUNE 1951

### Elected President Of De Laval Separator



C. B. Schmidt



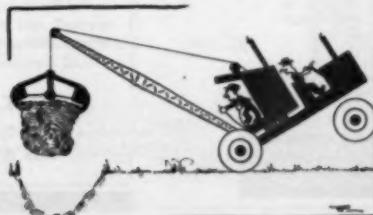
George W. Smith, Jr.

C. B. Schmidt has been elected president of the De Laval Separator Company, 165 Broadway, New York. Mr. Schmidt has been associated with De Laval for the past 29 years. He started with the company as a young salesman at the New York office and was then transferred to the Chicago office. Subsequently, he became manager of the industrial department at Chicago and following this, he served for 14 years as general manager of De Laval's western division. In 1945, he was recalled to New York to assume the office of vice-president. Mr. Schmidt is a graduate of the Carnegie Institute of Technology. During his many years in various positions with De Laval he has had close personal experience with all phases of its operations, in both the industrial and dairy divisions so that he is exceptionally well qualified to lead the company in a constructive program.

George W. Smith, Jr., has been elected chairman of the board of directors of the De Laval Separator Company and Mr. Smith is also president of The De Laval Steam Turbine Company, Trenton, N.J. Re-elected were E. Gray Merrill, vice president—manufacturing; James E. Austin, secretary and assistant to the president; and T. H. Walworth, treasurer. Geo. C. Stoddard, who retires as president and director after 30 years of active association with the company, will continue to serve in an advisory capacity.

### New Peoria Branch Office

Stanley E. Bovim has been named manager of a new branch office of Allis-Chalmers' general machinery division in Peoria, Illinois. Mr. Bovim has been employed by Allis-Chalmers since 1925. He has worked in the company's electrical maintenance and Texrope drive departments. Since 1933 he has been with the Chicago district office as a sales representative. Mr. Bovim is a registered professional engineer in the state of Illinois and a member of the Electrical Maintenance Engineers and the Chicago Millers Club. F. D. McGuire, Jr., has been transferred from the Chicago district office to the new Peoria branch as sales representative. He has been with Allis-Chalmers since his graduation in 1918 as an electrical engineer from Duke.



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Model EDP Diesel  
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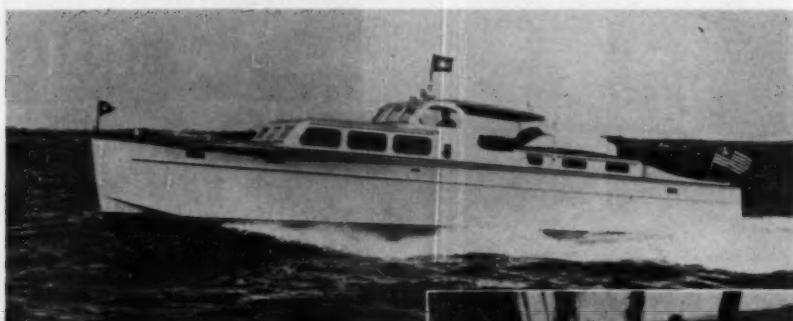
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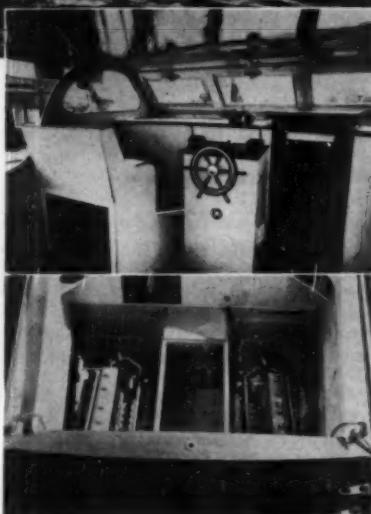
A SUBSIDIARY OF THE SPERRY CORPORATION

**WATERBURY 91, CONNECTICUT**

## SEAGOING YACHT



Although the *Juanita II* is said to be one of the fastest seagoing yachts in the world, her owner regards her mainly as a craft that offers the finest in comfortable living afloat. Owner of the craft is Captain Edmund F. Jewell, USNR, who was vice-commodore of the Corinthian Yacht Club, Washington D.C. in the early thirties and chairman of the President's Cup Regatta Committee when it was first organized. The yacht is an Offshore 48 model designed and built by Huckins Yacht Corporation. Top speed at 2050 rpm. has been clocked at 23.3 knots, although Captain Jewell prefers to operate at something less than her cruising speed of 20 knots at 1850. Located far astern are two General Motors diesel engines driving 24-inch by 24-inch propellers through Huckins Vee-Drive gear boxes. Within her 49-foot hull are all the appointments necessary for comfortable living—plenty of room, good beds, bath, deep-freeze unit and an extra cabin for friends. Five watertight bulkheads add to the safety of the vessel.



## Inland River Reports

By DAVID I. DAY

THE UPPER MISSISSIPPI has been on a high water rampage the like of which has not been seen in the springtime for more than 50 years. Various Minnesota ports like St. Paul, Minneapolis, Winona, and Red Wing are cleaning up and getting the evacuated families back in their homes. It will take many months to repair damages done to homes, farms, factories, and business districts. Many blocks in Dubuque, Iowa, Davenport, Iowa, and other cities are under water as this is written. As all the dams above Keokuk are flooded out, the diesel vessels serving the upper river are idle. The list includes the *Albert E. Heekin*, (760 hp., Cooper-Bessemer), *St. Louis Socony* (1200 hp., Busch-Sulzer), *Kansas City Socony* (1020 hp., National Superiors), *Emory T.* (800 hp., Cooper-Bessemer), the *Ernest T. Weir*, (around 1500 hp., National Superiors) and many more.

RIVERMEN UNANIMOUSLY vote the *Chas. W. Snider* of the Pure Oil Fleet the honor of being one of the most useful towboats ever to ply the inland waterways. She was launched nearly ten years ago at the Sturgeon Bay Shipbuilding & Drydock Co., Sturgeon Bay, Wis., and has been pushing oil, mostly on long trips, ever since. We noticed her the other day on the Ohio pushing up toward Pittsburgh under command of Capt. Gatewood. Her Cooper-Bessemer Type JS engines totaling about 1600 hp. were running smoothly and efficiently. The tow consisted of four barges of oil and a boiler boat.

FOUR OTHER VESSELS seen in rapid succession working hard on the upper Ohio were the *Peace*



### ....another Reiner Diesel Generator!

10 of these REINER diesel generators were shipped recently to a large industrial concern in Ceylon. This is a typical example of the universal acceptance of Reiner equipment throughout the world. REINER generating sets come in a wide selection of styles, types and capacities ranging from 5 to 90 KW for DC or 50 or 60 cycle A.C. Other sizes can be built into your own specifications.



## DIESEL ENGINE CATALOG

The purpose of this little advertisement is to tell you about Volume 16 of DIESEL ENGINE CATALOG which will be coming off the press about July 15th. This will be the 16th edition of the book that has earned the name of "the bible of the industry."

All smart diesel engine salesmen carry this book around in their car. When they run into some new competition with which they are not too familiar, the DIESEL ENGINE CATALOG gives them full, accurate information when they need it most.

The consulting engineer keeps this book in his reference file. It immediately gives him *all* data on diesel engines coming within a given horsepower range, speed range and weight range.

People who sell, people who buy, people who use diesel engines need this new, fully illustrated, up-to-the-minute volume. It has been completely revised and expanded. Advance orders are now being accepted for the limited edition. Price \$10.00 prepaid.

**DIESEL PROGRESS**  
P. O. BOX 8458, COLE STATION  
LOS ANGELES 46, CALIFORNIA

of the Union Barge Line, 16 years on the waterways, powered with old Winton diesels; the Keystone of the Keystone Sand Division, Dravo Corporation, 6 years out, pushing steadily and profitably with Fairbanks-Morse diesels; the lovely *Lehigh* of the UBL fleet, working with National Superiors, and the big powerful *Jefferson*, 170 feet long, with Cooper-Bessemer. At every port above Cincinnati we heard rumors of towboats being built and towboats being planned, all with diesel.

ONE OF THE BUSIEST places along our inland rivers is the yard of the St. Louis Shipbuilding & Steel Co., St. Louis, where four fine diesel vessels are under construction. The *Delta Cities* of the Lake Tankers Corporation will be one of the summer sensations with 3200 hp. Fairbanks-Morse engines. Of the same power with General Motors engine is the *LaGrave Socony* of the Socony-Vacuum Oil Co. No other boat there appears, however, to be arousing as much general interest as the *Memphis Zephyr* of the Street Towing Co., with 2800 hp. Superiors. *Lady Linda* of the Inland Oil Transport Co., is powered with 1800 hp. General Motors. Jones & Laughlin, Pittsburgh, have not named at this writing a neat little 430 hp. towboat using Caterpillar engines. Of interest to all the rivermen on the upper Mississippi is the repowering job on the *Tri-Cities*. This boat came out in 1940 from St. Louis Ship for Lake Tankers and has accomplished a world of work. Her present 1000 hp. engines are being replaced by 1800 hp. General Motors diesels.

THE FIRST OIL TOW of the 1950 season reached St. Paul, Minn., from Helena, Ark., three barges towed by the M. V. *White Gold* of the Canal Barge Co., the shipment being for the Clark Super Gas Co. With late ice in Lake Pepin and the bad high water later, the upper Mississippi traffic has gotten off to a very slow start.

A VERY FAST and powerful towboat is the new *Claude F. Tully* of the Patton-Tully Company, Memphis, Tenn., which recently averaged 7.6 miles per hour from New Orleans to Louisville, Ky. We observed her recently passing Wabash Island near Mt. Vernon, Ind. Her three barges, each 290 feet long, carried nearly 65,000 tons with later shipments scheduled of 70,000 and 80,000 tons.

MANY NICE COMMENTS have come regarding the dredge *George C. McCullough*, the property of W. R. Aldrich & Co., and the Kershaw Mining Co., Orange, Tex. This dredge is 100 x 30 x 8 in dimensions and powered by a 1000 hp. General Motors diesel engine. It was built recently at the Alexander Shipyard, New Orleans. Auxiliary power is supplied by three Superior diesels, 100 kw., 230 volt, d.c.

THE VERY NEWEST towboat of the American Barge Line, the *Mount Vernon*, is working on the upper Ohio, noted recently pushing two barges of alcohol. The barges are each 278 x 45 feet. Not long since we saw the boat pushing steel shipments south. The boat is a fine looker, a triple screw craft, utilizing Cooper-Bessemer engines.

QUITE A NUMBER of diesel vessels were at work for the first time on the upper Mississippi when the floods descended and are now back in service. The *St. Louis Zephyr* of the Street Towing Co., St. Louis, in the oil trade was one exciting much very pleasant comment. The *Sturgeon Bay Queen* is a first-timer, in the oil trade for the Mid-Continent Barge Line.

THE BIG 3200 hp. *Harry Truman*, twin G-M diesels, is at work on the Illinois and lower Mississippi. This fine pusher was built about four years ago by Avondale Marine Ways, New Orleans.

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## SUBMARINE THERMOMETERS

### Meeting Navy Specifications

These highly accurate instruments have cast bronze V case-brass fitting. Silvered easy reading scale. Removable window protects scale and Red reading mercury tube.

Range: 30° to 240° F. Standard. Also available, minus 40 to 110° F., 30 to 180° F., 30 to 300° F., 200 to 500° F.

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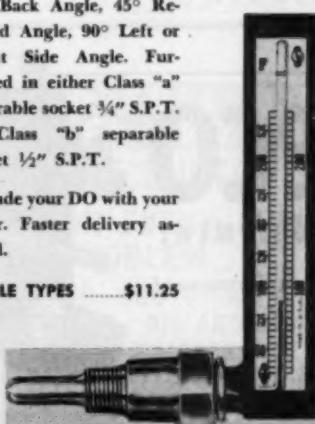
Available in straight type, 90° Back Angle, 45° Reclined Angle, 90° Left or Right Side Angle. Furnished in either Class "a" separable socket  $\frac{3}{4}$ " S.P.T. or Class "b" separable socket  $\frac{1}{2}$ " S.P.T.

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**TUTHILL  
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These compact, precision-built internal gear rotary pumps are recognized throughout the diesel industry for quiet operation, leak-free performance, low power consumption and long life.

This Tuthill Model L pump is available with either single or double-end motor in capacities from .33 to 3 g.p.m. and pressures up to 400 p.s.i.

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 1—New Sheppard Diesel Model 14 Power Unit with clutch, 3½ H.P. ..... \$500.00  
 1—Demonstrator Onan Electric Plant Model 3CK-1R, 3000 Watt, single phase 60 cycle, 110 volt. ..... \$400.00

All prices f.o.b. location. Address Box 498, DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, Calif.

## West Coast Diesel News

By FRED M. BURT

DESIGNER of many of the latest types of diesel-powered tuna clippers and other fishing vessels, Arthur De Fever, Naval Architect and Marine Surveyor has located his new offices at 701 East Harbor Drive, San Diego 1, serving both the San Diego and San Pedro-Los Angeles Harbor areas.

INSTALLED by Tacoma Boatbldg. Co., a new Union Diesel Model GA6, 500-hp. at 750-rpm., to re-power fishing vessel *Sogn*, Capt. Hans Aksa. Trials conducted under supervision of Union's service engineer, Paul Allen. This is the same type of Union diesel installed in *Two Brothers*, *Madelyn R.*, *Kathryn*, and *E. W. Scripps*; several such engines also being built for twin screw, river pusher type towboats.

**PACIFIC PEARL** new purse seiner working out of San Pedro; main power 500-hp. General Motors, diesel, 50-hp. Atlas auxiliary, Fairbanks-Morse generator and pumps; formerly the 82-foot *Juanita*, beached during a storm, rebuilt by owner, Antone Cosulich, San Francisco.

A 165-HP. Murphy diesel supplied by Engine Sales & Service, Los Angeles to Hector Lutteroth to power deep well turbine (U. S. Pumps, Inc.) for irrigation of large cotton acreage in Sonora, Mexico.

FOR THE Navy (via Standard Oil Co. of Calif.) for use at Elk Hills oil field, a considerable number of 15-hp. Waukesha natural gas engines, to power oil well pumping units; supplied by Bethlehem Supply Corp.

PURCHASED by A. D. Rushing, Santa Paula oil well drilling contractor (who drilled the first wells in the sensational Cuyama field), from Anderson-O'Brien Co., Los Angeles, for re-powering drilling rig No. 2, General Motors twin-six diesel engines, 260-hp., for the mud pump; GM twin four, 170-hp. for draw works.

A MODEL AD, 6-hp. Witte diesel (from Engine Sales & Service) for F. A. Stearns, Corona, Calif., to power small deep well pump through Johnson

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FUEL INJECTION EQUIPMENT  
for dependable performance!

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Chicago 40, Illinois  
MASTER CRAFTSMEN OF FINE FUEL INJECTION EQUIPMENT

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TRACTOR AND HEAVY  
EQUIPMENT MAN?

We have lists of trained Diesel, Tractor, and Heavy Equipment operators, service men, and mechanics available for employment throughout the country. If you have need of such a man we will be glad to furnish complete information without obligation to you. Write to

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## DIESEL ELECTRIC POWER

for  
IMMEDIATE  
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Unit Capacities  
10 to 1875 Kva  
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Cycles  
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Write or wire today for bulletins and complete information regarding these fine fully guaranteed, low cost DIESEL ENGINE GENERATING UNITS. Visit our plants at Sausalito (S. F.), California, and Jersey City, N. J., and see units in operation on our test stand.

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One 60-Gallon capacity Refinol Oil Reclaiming Machine. Used.

**CENTRAL MOTOR LINES, Inc.**  
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JUNE 1951

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TEMPERATURE CONTROL**



Automatic temperature control for jacket water or lube oil for engines from 3 hp. to 5000 hp.

"Amot" thermostats will give your engines many years of dependable operation without any servicing or adjusting.

Used for automatic temperature control on pipe line engines, electric power plants, marine engines, railroad engines, and on all other engine applications.

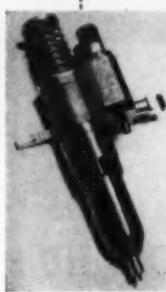
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**HANCOCK RECONDITIONED UNIT INJECTORS FOR GM 71 AND 567 ENGINES ARE AVAILABLE FROM OUR STOCK ON AN EXCHANGE BASIS, AS ARE GM 71 FUEL TRANSFER PUMPS**

**HANCOCK Service Gives You:**

- One day delivery from our stock.
- The service of a modern injector laboratory completely toolied with the latest grinding, lapping and gaging equipment to handle all necessary work.
- A flat price for injector exchange regardless of condition of the plunger and bushing.
- A completely rebuilt unit injector that has been thoroughly tested after an actual run-in test.
- Any output of 71 engine injector available -60 mm, 70 mm, 80 mm and 90 mm.
- An unconditional guarantee of satisfaction.

We will buy used General Motors and Caterpillar injection equipment.

Dealers write for our attractive proposition

**DIESEL SERVICE DIVISION**

**HANCOCK MACHINE COMPANY, Inc.**  
300 WALNUT STREET FINDLAY, OHIO

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Air-Mate Corporation	3		
American Bosch Corporation	24		
American Locomotive Company	22		
American Motors Co.	96		
Atlantic Metal Hose Co., Inc.	87		
Bacharach Industrial Instrument Co.	90		
Baldwin-Lima-Hamilton	20-21		
Buda Company, The	5		
C.A.V. Ltd.	80		
Central Motor Lines, Inc.	95		
Chicago Metal Hose Corp.	82		
Cities Service Oil Co.	23		
Cleveland Diesel Engine Div., General Motors Corp.	2		
Columbia Electric Mig. Co.	94		
Cooper-Bessemer Corp.	Fourth Cover		
Crofton Diesel Engine Co., Inc.	94		
Cummins Engine Co., Inc.	9		
DeLaval Separator Co., The	25		
Delco Remy Div., General Motors Corp.	6		
Diesel Plant Specialties Co.	93		
Eaton Manufacturing Co.	68		
Electric Machinery Mfg. Co.	4		
Electro Products Laboratories, Inc.	86		
Elliott Company	Third Cover		
Engineering Controls, Inc.	77		
Erie Bolt & Nut Co.	90		
Erie Forge Co.	26		
Fairbanks, Morse & Co.	11		
Federal Mogul Corp.	17		
Fitzgerald Manufacturing Co., The	93		
Fram Corporation	87		
Fulton Iron Works Company	76		
Gardner-Denver Company	29		
General Motors Corp., Cleveland Diesel Engine Div., Delco-Remy Div.	2 6		
Griscom-Russell Co., The	65		
Gulf Oil Corp.	27		
Guth Company	86		
Hancock Machine Company, Inc.	96		
Hilliard Corporation	95		
Honan-Crane Corp.	72		
Henry Vogt Machine Co.	60		
Washington Irons Works, Inc.	87		
Waterbury Tool Div., Vickers, Inc.	91		
Westinghouse Electric Corp.	67		



# ELLIOTT GENERATORS

run in size range from 60 kw 600 rpm, to 7000 kw 164 rpm. All in the famous Elliott "Fabri-Steel" construction which assures extreme crack-proof strength and rigidity, with easy adaptability to specific operating requirements.

Large or small, coupled type or engine type, low speed or high speed, the same Elliott high standards in quality materials and careful craftsmanship are rigidly maintained. . . For descriptive bulletin on the generator you need, write us stating capacity and type.



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1710

## FOR THE NIG . . .



### LIFE BEGINS AT 70 ...with Cooper-Bessemer Power

THE tug shown above began her career back in 1880—as a steamer along the Atlantic Coast. Bought in 1949 by Oulliber Bros., she was renamed the "Nig", was converted from steam to modern Cooper-Bessemer diesel power at the Calmes Shipyard, New Orleans.

Then this past summer the "Nig" sank. After being raised she was rebuilt by Avondale Marine Ways, Inc., and is now back in full-time service.

The "Nig's" 1100 hp Cooper-Bessemer diesel makes her one of the most powerful

tugs on the Intracoastal Waterway . . . makes her a favored boat for many of the toughest towing jobs. And, one thing is sure, with a power plant like that modern, reliable Cooper-Bessemer in her engine room, the "Nig" is set for another lifetime of hard, profitable work. You can't do better than a Cooper-Bessemer.

*The*  
**Cooper-Bessemer**  
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